MODERN PLASTICS

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JANUARY 1939

VOLUME 16 NUMBER 5

• GENERAL INTEREST

• TECHNICAL SECTION

• NEWS AND FEATURES

Cover color this month BLULAKE (Created by Textile Color Card Association)

F E B R U A R Y

Much has been written about Television—some truth, more fiction—but with the assurance that this interesting medium of home entertainment will become a reality this spring, we set about gathering pertinent facts some time ago. A staff writer has pestered presidents, vice-presidents and chief engineers; has witnessed Telecasts; has been "on the air"; to get first-hand experience and information. The results of this personal investigation will be yours exclusively with our February issue.

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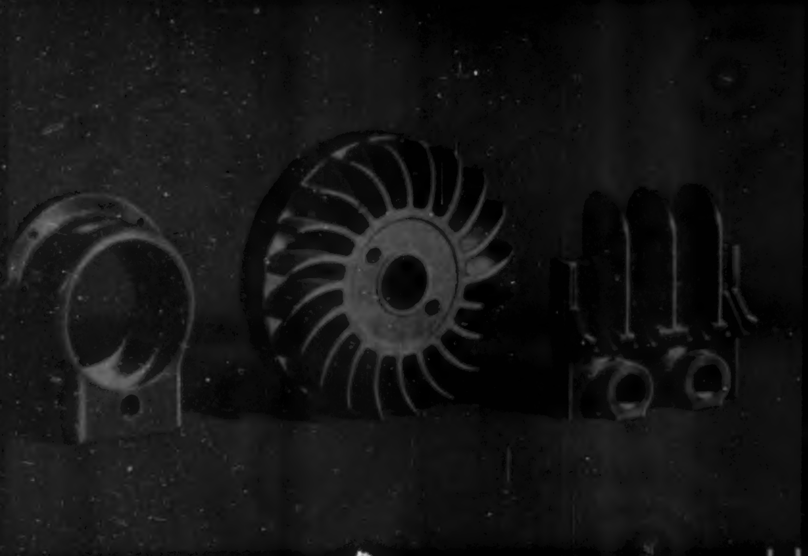

MOLDED INSUROK

by RICHARDSON

IN all the realm of plastics one name . . . Richardson . . stands preeminent as an unfailingly dependable source of supply. This enviable position was not attained through chance, nor circumstance. Rather it is the logical result of policies established three-quarters of a century ago, and zealously maintained through all these years of service to the industry.

Constant quality improvement; inviolate adherence to standards and specifications; unsurpassed manufacturing equipment and sincere guardianship of the customer's best interests have motivated Richardson growth and progress.

These Richardson characteristics have an immeasurable value to users of plastics who seek a source of supply thoroughly competent to meet every requirement and eventuality.

The RICHARDSON COMPANY

Melrose Park, (Chicago) Ill. — Founded 1858 — Lockland, (Cincinnati) Ohio
New Brunswick, N. J. — Indianapolis, Ind.
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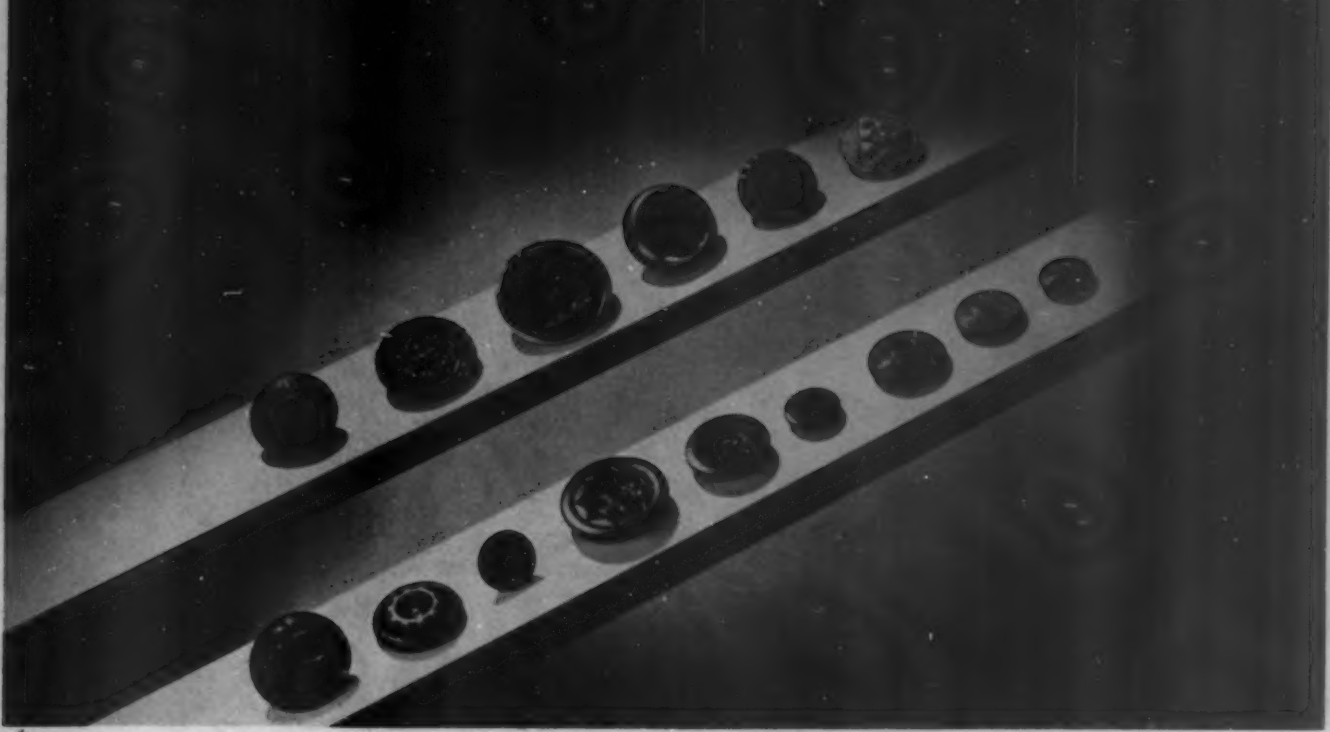

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EVER SINCE 1812

The old gives way to the new and now, a pioneer in the buttons and plastics industries builds a new plant

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The top row of early buttons (Fig. 1) includes metal, composition, jet encircled with metal, and jet alone. Lower row shows early examples turned out by Waterbury Button Company. This hand press (Fig. 2) is one of the first used by the Company to mold plastics

WHILE THOMAS JEFFERSON WAS WORRYING about the state of affairs between this country and Great Britain, then at war with France, Aaron Benedict, an early settler in Connecticut, was laying plans for a business which turned out to be one of America's great industries. It began, of course, in a very small way under the firm name of A. Benedict, but as the business grew and prospered, Mr. Benedict conceived the idea of divorcing each branch of the business from the parent organization as soon as it was strong enough to operate on its own. In this way he became the granddaddy of what is now The American Brass Co., as well as The Waterbury Button Co., whose plant we shall describe in some detail later.

Times were bad when this business began. Great Britain forbade commerce by U. S. ships between the West Indies and European countries. British warships searched U. S. ships off the American coast. They impressed American sailors into British service; it was alleged that they incited Indian tribes to depredations on the U. S. frontier. In retaliation, President Jefferson enforced a boycott of British goods under a Non-importation Act, but otherwise held to neutrality even after an attack by the British ship *Leopard* on the U. S. frigate *Chesapeake* in June 1807. The Madison administration in

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Presses are lined up back to back in this new press room of the Waterbury Button Company, with steam and air pipes concealed in troughs beneath the floor. Natural daylight floods the room which occupies the entire one story building recently built. Construction is such that a second story can be added when required

1809 adopted a more vigorous policy which led to a declaration of war against England by Congress in 1812.

War meant an increasing number of soldiers and sailors in the U. S. service. Soldiers and sailors meant uniforms. And uniforms meant buttons galore. Aaron Benedict, decided then and there to go into the button business. Brass buttons, which had formerly been brought from England, were no longer available from that source. Neither was brass, so he had to scout for it. He bought every pot, pan and kettle that he could get his hands on, established a rolling mill outside of Waterbury and rolled his own blanks.

From these he made buttons while the brass lasted but before the end of the war most of the buttons were being made from pewter of which there was a greater supply. Old pewter plates and dishes were sometimes used. Plastic buttons were unheard of at this time.

The war over, Aaron Benedict's business grew in the aftermath of prosperity. Brass entered new fields. With a new partner, Gordon W. Burnham, Benedict later formed the Benedict & Burnham Mfg. Co., which became one of the first casters of brass in this country and operated under this name until 1849.

In 1840, the Adams Scovill Company obtained the American rights to make daguerreotype cases, which became exceedingly popular about that time, and in the months that followed, began what was probably the first plastic molding operations in this country. These cases were sometimes made of wood, covered with leather, but more often they were molded of some thermoplastic composition, the name of which no one seems to know or remember. Most of this molding was done in another plant in New Haven. The daguerreotypes were framed inside with a highly ornamented stamped brass frame frequently washed or plated with gold.

This company had many ambitions and activities however, and the daguerreotype cases were but incidental. Later they developed and promoted the Ansco film which became a business by itself.

Benedict & Burnham Mfg. Co., joined with Festus Hayden & Sons in 1849 to form the Waterbury Button Company. Brass buttons were by no means extinct and some elegant examples remain to record their progress in the field of feminine apparel as well as for the adornment of civil and military uniforms. Some of these may be seen pictured (Fig. 1) with early examples of molded

plastic buttons turned out by this company (and a few from the author's personal collection). Stamped letters, floral motifs, even bugs and bees, appeared in the designs and when molded buttons first appeared they frequently were encircled with a band of metal or made with metal inlays as these examples show.

Then in 1861, came the Civil War. Brass buttons were again in great demand. And with a perfect set-up to turn them out quickly in the enormous quantities required, Waterbury Button Co. entered a period of unprecedented prosperity.

The first serious attempt to mold plastic buttons came just after the war. Watching the success Adams Scovill Co. enjoyed with its molded daguerreotype cases, and later obtaining some of the dies, the Waterbury Button Co. began experimenting with thermoplastics—molding a few plastic buttons, checkers and dominoes on a hand press (Fig. 2). Similar presses are still being used in laboratory work for making experimental color sheets in cellulose nitrate and cellulose acetate plants.

When Celluloid came along, the company jumped into production and made rafts of these buttons for which there was a terrific demand. The bright lustrous finish of this new material caught the public fancy and a riot of color, mottles and striations ensued. When Bakelite first reached the market, in sheet form (and at 62 cents a pound) this company was among the first to use it for buttons. They had to put it on a steam table to soften before molding it in the dies. Then when this material was discovered to be ideal for electrical parts because of its dielectric properties, they began molding things other than buttons. Among the first departures was a small part molded for a well-known manufacturing company at a cost of forty-five cents each. The same part today would cost about two cents.

From this beginning with the modern plastics, the management recognized the advantages of organic materials over the current shellac compositions. They realized that because of their superior properties, their greater strength, greater resistance to heat, better polish, harder surface, they would quickly replace these compositions in industrial applications and such as well as for buttons, and they set about securing suitable equipment to handle plastics along modern lines. Toggle-type compression presses were installed to handle the new molding powders. The machine shop was turned into a madhouse getting out new dies that would work. But right here, it was found that the company had a lap on this technique because of experience in turning out dies for brass stamping production. (*Please turn to the next page*)

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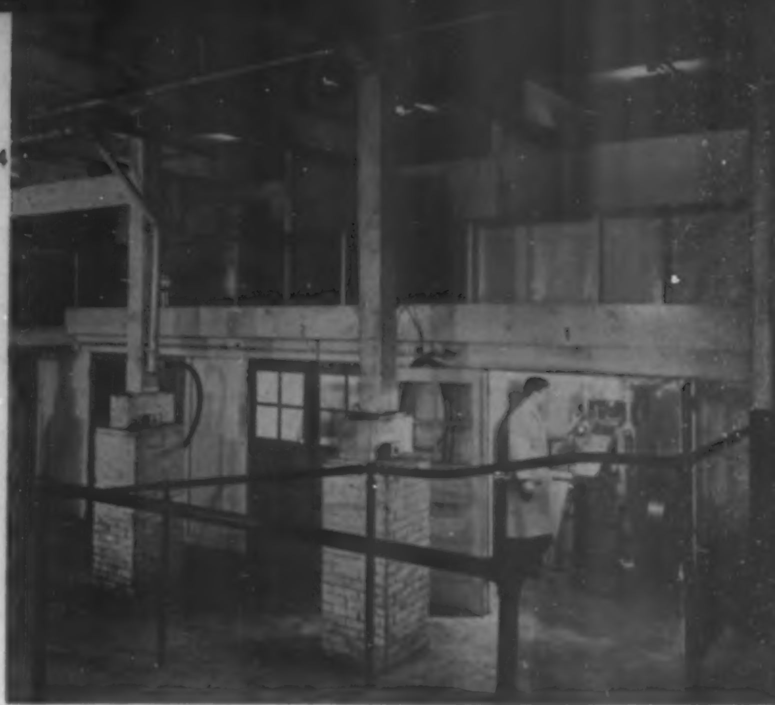

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Preform presses are of the Company's own design and manufacture. Each operates in a separate enclosed room with powder piped directly from an enclosed drum above (Fig. 4). One of the presses may be seen through the open door. The storage room (Fig. 5) is air-conditioned to keep compounds in perfect condition. The tumbling equipment (Fig. 6) is located in a room adjacent to the finishing department. Here flash is removed and small molded parts are polished.

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The rest of the story is current history and while the company still supplies the majority of brass buttons and novelties made in this country, the plastics divisions contribute more than 70 percent of its present business.

The metal-working background of the company and its continued activities with metals provide many advantages for its plastics customers. Tools, dies, inserts, inlays, together with any metal parts used in combination with plastics can be made and assembled under one roof. In present methods of production, metal stampings are frequently combined with plastics to give them added strength. When such metal parts are made on the premises of the molder, there is a coordination of effort which precludes errors and misunderstandings and accrues to the benefit of the clients of such concerns.

The new pressroom (Fig. 3), completed within the past year, is a model of efficient and economic operation. It is flooded with natural daylight and well ventilated to remove excessive heat caused by the operation of the presses during warm weather. Presses are placed back to back and the piping is carried along in an underground trench covered with boards so that the floor is level and clean at all times. Booths are built around presses molding light colors and special powder dispensers have been invented to prevent color and dirt contamination. The original drum of molding compound is suspended between two pipes with a huge funnel fitted to its dispensing end. The operator holds his loading board under the funnel with one hand, releases the spring cap with the other hand until one row of cavities is filled. Then turning the board, he fills the cavities on the opposite side. Little powder is wasted and no dirt can enter the barrel or drum. In the molding room there is a degreaser where all molds are treated to remove every vestige of grease before being placed in a press. The building is constructed so that another story can be added at any time.

Lighting fixtures, in the development of which this company has played a prominent part, are molded in a separate room, called the "white" room. There are three presses, of 700-ton, 300-ton and 170-ton capacity, in this room with a special enclosed scale for measuring molding compounds.

Preforming is accomplished in another section of the plant (Fig. 4) under ideal conditions. Each preformer operates in a separate air-conditioned room from powder fed to it through covered pipes from the original drum enclosed in a metal jacket on the floor above, which can be seen in the illustration. Preformers are of the Company's own make and although they are of the single-punch type, they are capable of turning out about 300 pills a minute. They are extremely simple in operation. There are several cavities in a horizontal row with punches spaced above to fit. The power loader moves forward and backward, pushing off the preforms with the former operation and loading the cavities on its return. Pills pop up from the bottom after they are pressed, just in time to be pushed off—in gangs—by the loader as it refills the cavities for the next operation. A sizable storage room (Fig. 5) is provided with controlled temperature and humidity to protect the supply of molding materials.

The company generates its own electricity and the presses are serviced by a huge accumulator, loaded with 50 tons of scrap iron and located in a separate building quite some distance from the molding room. All piping is underground. A spare pump provides insurance of operation in the event of possible breakdown of the one in use at any time.

A complete tool room (Figs. 7–8–9) is maintained in the adjoining plant where molding dies are made, refinished and repaired by master mechanics who have been long with the firm. Dies are made here also for their metal stamping departments, as are inserts, inlays and other metal parts for the plastics division. A 1200-ton hobbing press and several duplicators facilitate the work of making the numerous intricate dies and molds.

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Polishing and tumbling equipment (Fig. 6) is located in a separate section of the finishing department. In the inspection room (Fig. 10) girls operate on molded pieces while seated at long rows of benches facing the windows. They are provided with natural daylight for these important hand finishing chores. Business-like benches equipped with modern punching and drilling machines are at one end of the room (Fig. 11) where these operations are performed. Lighting fixtures are capped, inspected and packed in a finishing room of their own (Fig. 12).

Urea reflectors and lighting fixtures are increasing in demand by architects and decorators because of the color possibilities of the materials and because their light weight permits more delicate and pleasing suspension means.

The Waterbury Button Company may or may not, be the oldest plastic molding concern in America, but its interesting history brands it one of the pioneers in the industry with a continuous record of service to its customers of one hundred and twenty-seven years. To our knowledge, at least, there are no other molders whose plants are an outgrowth of the war of 1812.

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The machine shop, or tool room, is equipped with every modern device for accurate and economical operation (Figs. 7–8) and is manned by expert engravers, tool makers, and mechanics of long experience in making molds and metal parts. Fig. 9 shows the huge hobbing press where multi-cavity molds are made. Finishing and inspection departments are well supplied with daylight. Hand finishing operations are performed by young women seated in long rows at either side of the long room (Fig. 10). Machine finishing, drilling and such is done in another section of the finishing department (Fig. 11). Lighting fixtures and reflectors are handled in another section (Fig. 12) where experienced hands assemble delicate parts ready for shipment. Some of these reflectors and hook-ups are shown suspended above

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WICO AND

by NATHANIEL STODDARD*

WE TITLE THIS ARTICLE "WICO AND PLASTICS" because the Wico Electric Company, W. Springfield, Mass., has found that a reasonable share of their success can be attributed to the practical and economical use of plastic materials. In this particular case "Wico" and "Plastics" are synonymous. The use of plastics by the Wico Electric Company is a perfect example of product improvement through close and continuous cooperation with a molder.

Let us turn back to the original founding of the Wico Electric Company—more for the purpose of knowing just how they began the manufacture of magnetos rather than merely history. In 1897 Thomas Witherbee invented the first portable storage battery (Ignitor) and formed the Witherbee Ignitor Company. These batteries were used on all the earlier automobiles. Naturally the company grew rapidly. Then in 1907, M. P. Ryder invented a new way to make a spark, the beginning of the magneto—big, cumbersome and costly as it was.

In May 1915, Phelps Brown and E. L. Stoughton, now president of Wico, bought the controlling interest in the Witherbee Ignitor Company. From this point on, it became a policy of the company to make the best industrial magnetos for as little money as possible. These men knew that in order to become the leaders in the industrial magneto field they must pioneer, turn to research and engineering for new materials and for new ways to improve the operation of magnetos and simplify design. Their untiring quest for better ways of doing things may be considered the main reason for their careful study of plastics and the ultimate adoption of them.

One of the first Wico industrial magnetos "sported" one single plastic part. We say that in somewhat of a light manner because the latest Wico magneto in comparison with the first is just as different as a streamline train and a gay nineties bustle. This first plastic part was a terminal post perched on the top of a rather awkward, all metal, heavy magneto. The terminal had to be insulated—therefore plastics was used. At that time no thought was given to any other of the advantages which plastics offered.

One man in the Wico Electric Company who perhaps is mostly responsible for developing their use of plastics is K. A. Harmon, vice-president in charge of engineering. Having the foresight that prominently marks this flourishing company, Mr. Harmon and his associates realized that not only would plastics provide insulation but through redesign, with plastics definitely in mind, they could simplify assembly, reduce the weight of the magnetos, improve appearance; in other words, produce a finer product for less money.

This period of redesign has been spread over the last three years. To show this progress in the use of plastics

* Plastics Department—General Electric Co.

let us take five of their more or less similar models and follow the careful development of each magneto with the steady increase in the use of plastics and the influence these materials have had.

Three years ago Wico produced their model *H* single cylinder magneto (Fig. 1) especially for International Harvester's type *LA* engines. The plastics parts on this magneto consisted of a molded terminal and coil lower case and two or three laminated washers. The purpose of these plastic parts was purely for insulation—the terminal for conducting the secondary current (as high as 10,000 volts) outside to the spark plugs and the coil jacket for keeping the current within the coil and eliminate current leaks and grounding. So, in their first industrial magneto, the model *H*, Wico thought of plastics only as an insulating material.

Fig. 2 illustrates Wico's next magneto development, model *LD* (one cylinder and four cylinder)—the first successful low cost multi-cylinder magneto for garden cultivators, cement mixers, marine engines, lighting plants, water pumps, power lawn mowers, etc. Here we find an increase in the uses of molded plastics, some for insulation, others for different reasons. With this magneto come the first indications of applying plastics so as to take advantage of some of their other properties.

We still find the coil jacket, terminal post (improved), plus the distributor cap, and distributor arm (necessary on multi-cylinder magnetos), made of plastics to provide insulation. The most important application of plastics on this model is the molded gear housing similar to Fig. 8. On model *H* the housing was made of metal which in service was badly corroded by the considerable amount of ozone generated in the distributor compartment. By making tests, Wico designed their gear housing for plastics to overcome the effect of the ozone and to eliminate the forming of salts caused by corroding. The salts have a tendency to absorb moisture, affecting the operation of the magneto. To have made the housing out of a non-corrosive metal would have proved too expensive but using plastics enabled Wico to keep the necessary metal parts small and to make them of non-corrosive metals. In this, the second magneto of the group, we find plastics reduce weight and cost, and improve the operation and appearance.

The result of certain observed difficulties in the Model *LD* brought about a redesign and the development of the model *A* (Fig. 3), a one, two and four cylinder machine. Wico's first problem was to provide better stability and a more rugged operating structure. By anchoring the core within the housing, they found that this could be accomplished. But, how would they close the top, over and around the coil? From their experience with the metal housing of the *LD* model they knew that a metal cover over and (*Please turn to page 70*)

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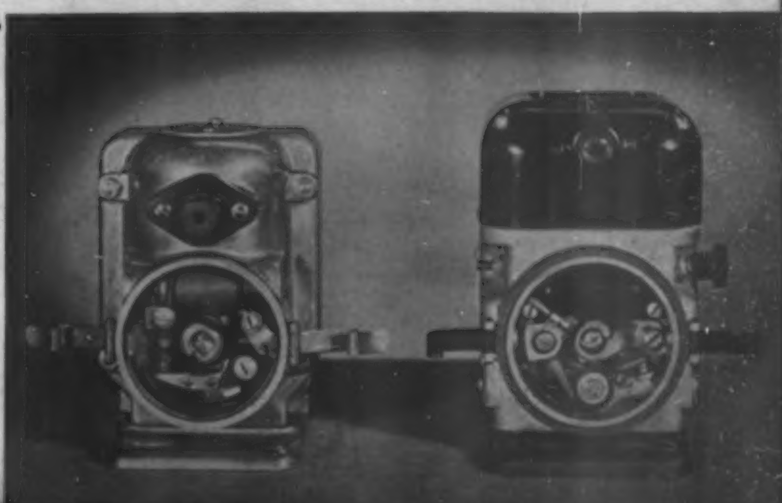


OUT OF PLASTER MOLDS

IT IS INTERESTING TO LISTEN TO A CONSTANT STREAM OF MANUFACturers, designers, and artists ask "Can I make things of plastic without large-scale equipment? Can I shape them by handicraft techniques?" Often, when they find usual methods unsuited to their plans, they drop their ideas and turn to more conventional means. But Lenart Import, Ltd., wanting to make gift items for home decoration in a new, different way have found a plastic material and a process by which to form it. These colorful, lustrous vases and bowls are the result. Smart graceful designs carried out in iridescent shades of magenta, amber, lavender, rose and other rich and delicate hues are formed in plaster of Paris molds. Slightly translucent, light playing on their somewhat mottled coloring brings out deep overtones and beautiful shadings. Yet, despite their delicate appearance, they are more than decorative. Called Shellflex, the material is a cellulose acetate base compounded with special ingredients to make it water-resistant, and capable of molding this way. One of the bowls, by actual test, has held water more than a month with no sign of deterioration or leakage. Though they are extremely flexible (two sides may be touched together easily) they hold their graceful shapes indefinitely. They range in size from four to twelve inches and have attracted much interest in retail stores. Don't ask us what they put with the acetate. They won't tell.

CLEOPATRA GOES TO WORK

Says EVE MAIN

And with the help of Lurelle Guild turns out a premium that goes to town

"FOR ONLY 10 CENTS AND THREE BOX TOPS, we will send you this beautifully decorated child's cereal bowl...................."

"Send 25 cents together with four wrappers for your sterling silver cake server...................."

"A handsome platter ($3.00 value) for only $1.00 and six labels.........." Tempting offers these! And housewives reading about them in newspapers and magazines, hearing them described and praised over the radio, save box tops, wrappers or labels and send along dimes, quarters or dollar bills to get them. In this way millions of premiums offered each year by national advertisers find their way into homes all over the country and with them, of course, the advertiser's product.

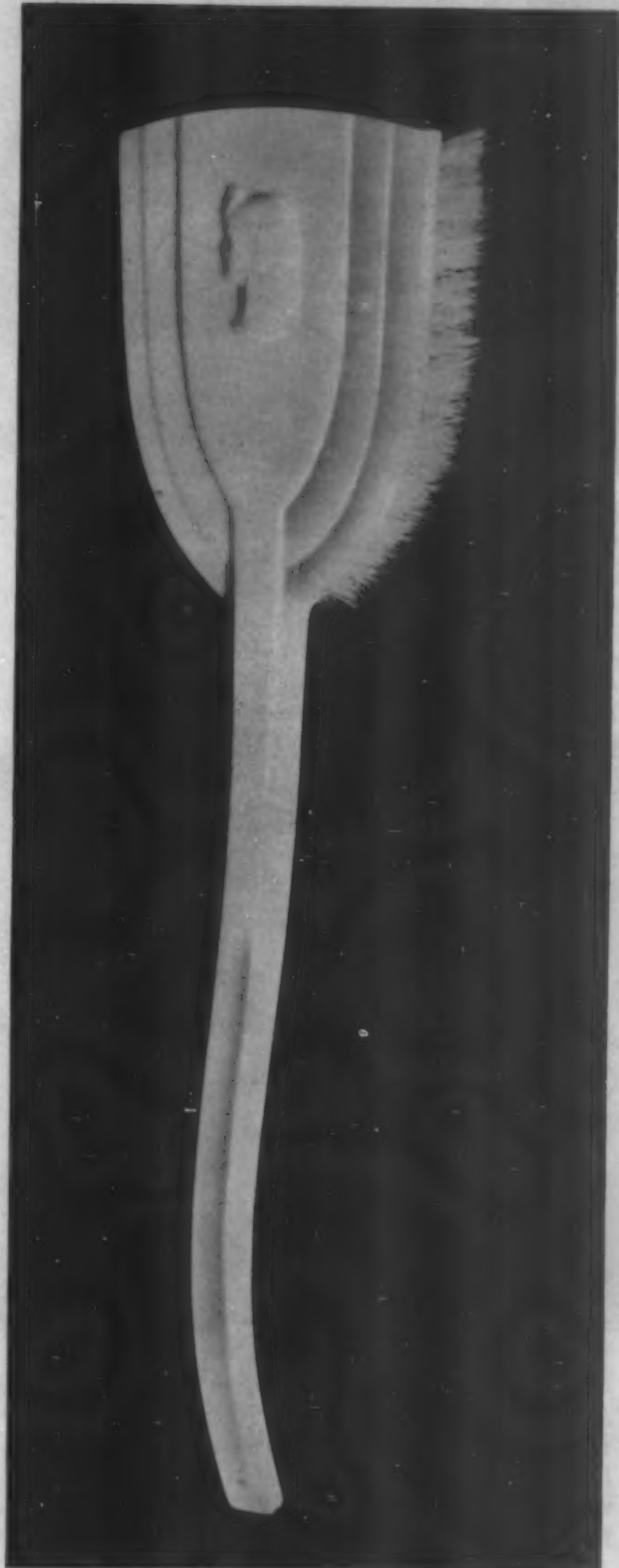
Time was when premiums were chosen because they were inexpensive, because they sounded impressive and looked big in quality whether they actually were or not. But no more. Too many premium programs failed because after being egged on to buy the product and send for the offer, the consumer found it was not as handsome as it was painted, not particularly useful and certainly nothing that she would want to use in her kitchen or on her table. Naturally she resented being taken in by a lot of pretty words, and like as not her peeve went so deep that she figured if the offer fell so far short of what it was cracked up to be, the manufacturer's product undoubtedly was just as inaccurately represented—and changed to another brand.

All of which has made the choice of premiums a serious business, and even to be considered for the purpose, an article must first of all be something that is useful about the house; something that looks good and wears well; something that actually has the value claimed for it. Perhaps the premium offered is to be used with the manufacturer's product; perhaps it is entirely separate and apart from the product, but whatever it is, it must be up to the standards set for it.

Working out a premium isn't done in a hit-or-miss fashion. The time, trouble and expense that goes into its design and introduction are no small items. Take the new cast phenolic resin bath brush recently created for Procter & Gamble (shown at the right). Not just another bath brush but one that is well-styled with all the elements of a much more costly piece. Let's follow through the process of developing this brush.

To do this, our first call will be on L. R. Bressler, vice president in charge of sales for Ox Fibre Brush Company (suppliers of the brush). Mr. Bressler was switching off a tiny radio on the window sill a this elbow when we entered his office.

"Too bad you didn't come a few minutes sooner," he greeted us; "I was just listen- (*Please turn to page 68*)



CATALIN

THE BIRTH OF A BOTTLE

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Here you see ten steps taken in creating a new family of bottles for a manufacturer of famous cosmetics, The Woodbury Company. The manufacturer, with his advertising agent at his right, negotiates the idea with designers Blow, De Vaulchier and Wilmet (in the background at the left) who listen attentively as he tells them what he thinks about bottles and industrial designers generally. All complimentary, of course.

Mr. De Vaulchier might have come from Missouri, the way he has to be shown, only it happens he came from France. Here he is, interviewing the sixteenth (or maybe the seventeenth) druggist who gives his opinion why one brand of cosmetics outsells another. It seems that the industrial designer needs the qualifications of a G-Man as well as a knowledge of art, engineering, manufacturing processes and selling.

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Color, and the woman's point of view, are both essential to the successful package. So here is Miss Grobe, who has Titian hair and an instinctive appreciation of beauty, making final renderings to scale for the blueprints. Mr. Hunter, of the organization, adds a few strokes of his brush to a label for the bottle to be.

Here's where plastics come in to give us a reason for this presentation. Y. Mogi, Oriental carver of ivory, fabricates a perfect visual of the bottle from transparent cast resin while George Blow peers over his shoulder to watch every move. Then: Back into conference with client and salesmanager while designers explain why the bottle, modeled in plastics, is just what millions of women are breathlessly awaiting. This is a crucial moment in the birth of a bottle! If the salesmanager says it is bad, the manufacturer is sure to agree; then they begin all over again.

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A week later when the espionage reports are in from the battlefront of retail stores, Georges Wilmet sketches various conceptions of a bottle that "has what it takes" or can "take what it gets." George Blow does his share of "kibitzing" and hopes by the time designer Wilmet has used a couple of reams of paper and innumerable pencils, that the right conception of a bottle will emerge.

Now we are getting three-dimensional as designer Wilmet translates his sketches into a "dummy" bottle. No! That's not soap, it is modeling clay from which he will shape a "visual" of the bottle which can be changed easily while in this plastic stage. This model will take much abuse and critical inspection before it progresses to the next step and is only a preliminary to the semifinals in the birth of a bottle.

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Now we know the design was approved. Here, a year later, we see one of those millions of cosmetic consumers who wanted just that kind of a bottle. Between the previous picture and this one, glass furnaces have flamed. Bottle-making machinery has blown and formed bottles in replica of the plastic model. Printing presses have hummed as they turned out attractive labels. And, of course, the manufacturer has filled each bottle with his product. Probably within the year these men will be in conference again to conceive a new and different container.

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Meantime, we have chosen the Woodbury After Shave Lotion bottle with its classic Greek motif and smart molded plastic closure to illustrate the result of this designing endeavor. It is a typical member in the new "family group" of current design. The Grecian pattern is repeated in color to ornament the label.

FOR CLASS OF 1960

Here's how 1938's most popular toy was evolved: F. M. Hoover, of Hoover Products, Inc. took home some molded color samples which illustrate how various colors look when molded. Suddenly, it disappeared, and a strange rattling noise came from the direction of Hoover Junior. He had found it, liked the gay colors and the noise—and thus a new rattle was born.

"Plakies" is its name, and the young gent holding it in the picture reports that it's very satisfactory. He likes the Plaskon colors fully as much as grown-ups do, and no matter how much he gums or, later, chews the discs, the color and lustre can't come off, and the smooth surfaces are easily kept clean.

Consolidated Molded Products is the molder.

PLASKON

DEWALD BANTAM

That black form at the left towering behind this smart Plaskon radio, is a telephone handset, which is one way of showing that the cabinet is only four and a half inches high. It's the DeWald Bantam, a tiny but finely executed job by United Scientific Laboratories, Inc.

Molded in several Plaskon colors—red, ivory and blue—the Bantam housing is one-piece, with attached feet in contrasting Plaskon shades. Vertical ribs carry on over the top of the set, with slots between to form a very practical grille—one that offers a minimum of difficulty in removal of flash and gives the cabinet a clean, modern look. The set itself is a four-tube, AC-DC, regular broadcast band receiver.

Consolidated Molded Products, Inc., molds the DeWald Bantam.

* *Trademark Reg. U. S. Pat. Off.*

PLASKON

2121 SYLVAN AVE.

CANADIAN AGENT CANADIAN

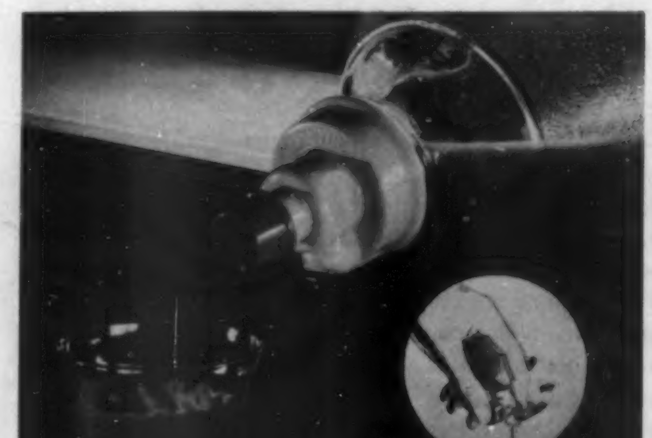
STREAMLINED LIGHT

From Cleveland comes the first one-piece Plaskon Lumiline Fixture, developed by Dean Holden. Smoothly contoured and highly decorative, this modern fixture is being widely used in homes, theatres, shops, restaurants and trains.

Says Dean Holden, designer and manufacturer of the fixture: "We used Plaskon because it eliminated assembly operations and exposed screws, and prevents all corrosion and rusting, even in salt atmosphere. Furthermore, Plaskon's colors are attractive and permanent, and the material itself is self-insulating—an important point in bathroom and kitchen installations where wet hands and condensation are present."

General Electric molds the Holden Lumiline fixture in a variety of Plaskon colors.

MOLDED COLOR



PLASKON FAUCET

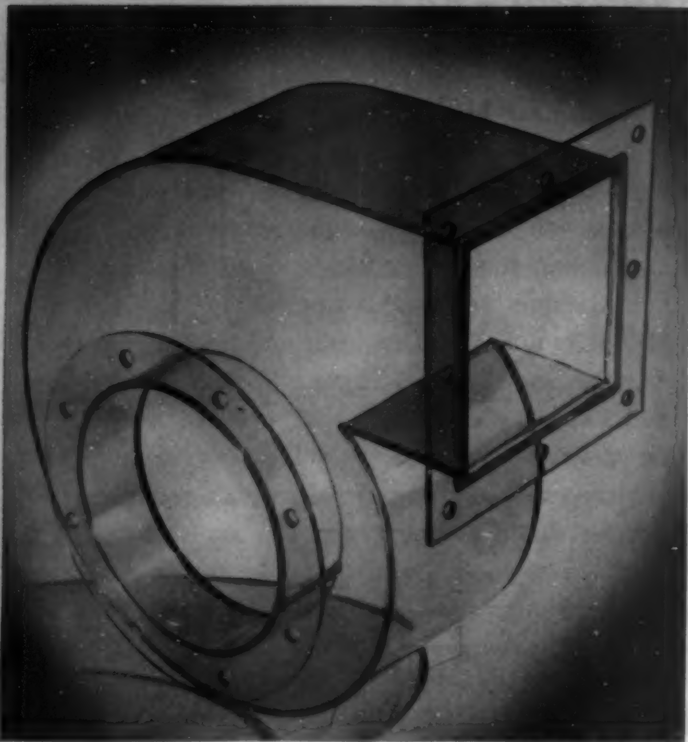
For fast dispensing of water, milk and other liquids kept in refrigerators, there's nothing like the Seel-Flo faucet. And for molding an intricate and completely inert device such as this, there's nothing like tasteless and odorless Plaskon to assure perfect functioning and absolute safety for food products.

Most important of the Seel-Flo features is its self-venting device which lets air in while the liquid flows out, yet hermetically reseals the minute the button is released. And naturally, since the Plaskon is in direct contact with food products, convincing testimony to its inertness is found in the Seel-Flo guarantee that it will not affect the fluids in any way. Other models are made for such liquids as solvents, petroleum products, etc.—all of which embody the hermetic seal which prevents evaporation.

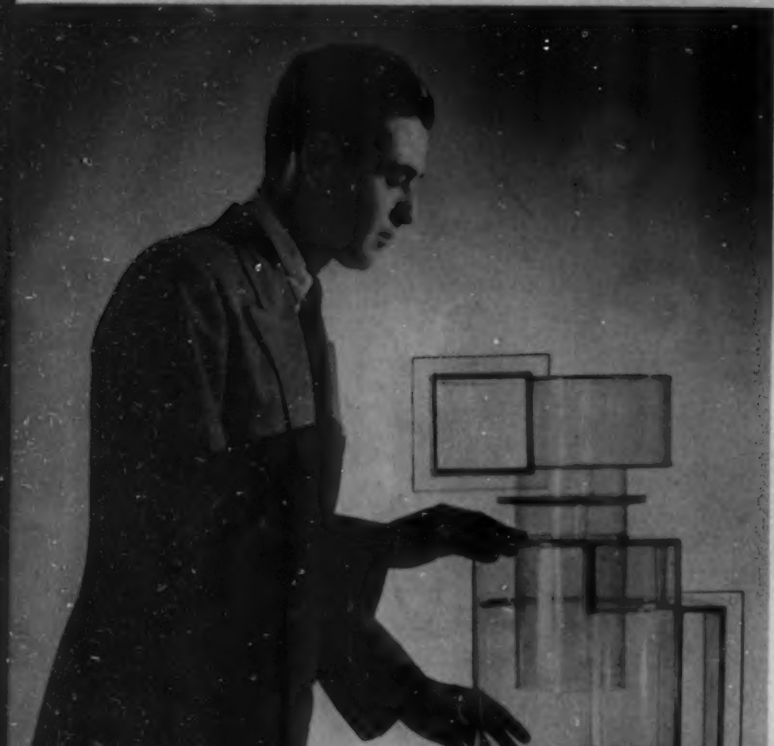
Remler Co. Ltd. is the molder.

COMPANY INCORPORATED
TOLEDO, OHIO
INDUSTRIES LTD., MONTREAL, P.Q.

SEE HOW IT WORKS?



PHOTOS COURTESY STRICKER—BRUNHUBER



"SEE THE DUST-LADEN AIR BEING SUCKED IN through the duct and whirled in slow eddies? Look at the dirt particles dropping steadily to the lower chamber leaving the air pure and clean," says the salesman.

There's nothing confusing in that kind of a demonstration, nor is there any need to pore over tedious blueprints to follow the process. Technical explanations are clearer, more effective, when listeners can see the operation.

That's why the model of a Buell dust collector, built for the Power Show held in New York last month, was such a successful merchandising aid. Although it reproduced actual service models in size, function and dimensions, anyone could look right through its transparent cellulose acetate walls and see at a glance what happened inside.

Even models of this size (you notice that the one shown at the left stands almost as tall as a man) can be made from this thermoplastic material. Sheets, softened by steam or hot water are cut to proper size and then shaped around forms in the pattern of the original. Firm, invisible joints are made with special cements to finish each part in trim fashion. The closeup at the top of the page shows how the edges are brought together with no blemishes or dark spots. With all parts assembled and fitted with motors, blowers or other working parts from standard equipment, the model is ready to go into operation as a dramatic counterpart of those operating under service conditions in laboratories, factories and mills in industry. Simply set up, and controlled in the same way as production machines, the models duplicate them for everyone to see.

Thus sales talks that might become involved in long confusing descriptions resolve themselves into the simple question, "See how it works?"

CAST RESIN FORMS

SHEET SIXTY-NINE

These forms, in a variety of colors and degrees of translucency, are supplied in the cross sections shown, in weights and lengths indicated below. They may be fashioned into finished articles by sawing, slicing or grinding them into shorter lengths, which are then buffed or polished. While they were originally used to make furniture accessories, their application is not limited to this classification. Name and address of supplier will be given on request.

Sheets One to Fifty-Two reprinted in book form, 25c in coin or stamps

898. Hamper handle, approximately 2 1/2 in. across the bottom. The form as a whole weighs 1.13 lbs. and is 12 in. long

899. Hamper handle 3 5/8 in. across. The form is 14 in. long and weighs 1.36 lbs.

900. Drawer pull, 4 in. overall width, in forms 14 in. long weighing 1.10 lbs.

901. Hamper handle 2 7/8 in. wide in forms 19 1/4 in. long that weigh 1.37 lbs.

902. Drawer pull 2 1/2 in. across. The form is 12 in. long and weighs .75 lb.

903. Drawer pull 3 in. width in forms weighing .45 lb. that are 12 in. long

904. Decorative pilaster 3 3/4 in. wide. The forms are 19 1/4 in. long and weigh 1.55 lbs.

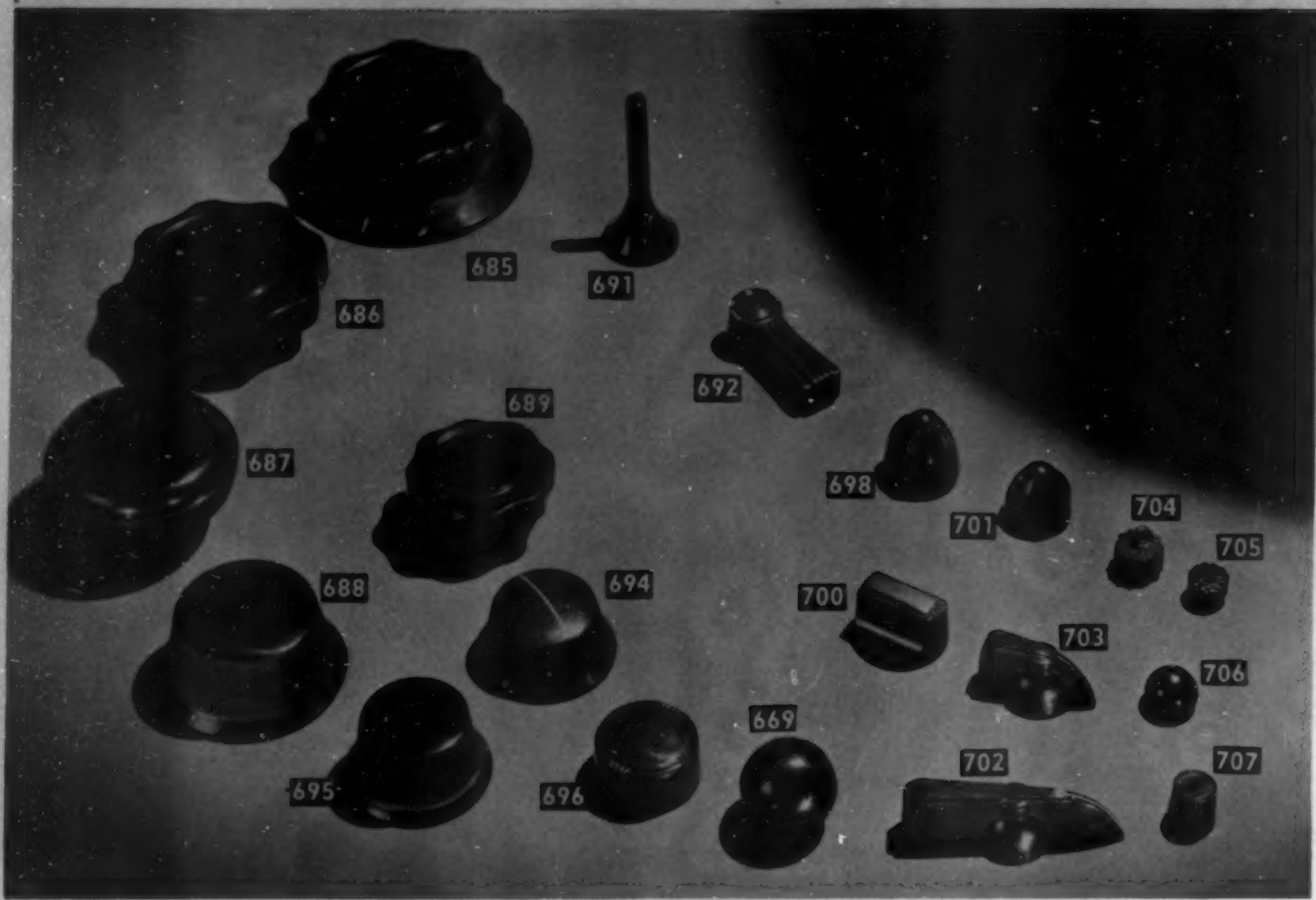
905. Drawer pull 3 3/4 in. across the bottom. The form in which it is supplied weighs 1.7 lbs. and is 13 3/4 in. long

906. Hamper handle 3 5/8 in. width, in forms weighing 1.58 lbs. that are 12 in. long

907. Drawer pull 5 in. wide in forms that are 14 in. long and weigh 1.39 lbs.

908. Drawer pull approximately 4 1/4 in. wide, in forms 14 in. long weighing 1.15 lbs.

**Address all inquiries to Stock Mold Department, Modern Plastics, Chanin Building, N. Y. C.
All molders are invited to send samples from stock molds to appear on this page as space permits**



Sheet One to Fifty-Two reprinted in book form, 25¢ in coin or stamps

STOCK MOLDS

SHEET SEVENTY

Radio and control knobs, lever balls and closures are available from stock molds. Molders' names and addresses will be supplied on request.

685. Knob 3 in. in diameter by 1 in. in height with a hole on the under side 1/4 in. in diameter and 5/8 in. deep

686. 1 5/8 in. diameter knob, 3/4 in. high with hole 1/4 in. in diameter and 1/2 in. deep

687. Knob with threaded brass insert in opening 3/4 in. in diameter. Overall diameter 2 in.

688. Radio knob 1 1/2 in. in diameter, 7/8 in. high and depth of hole 5/8 in.

689. Knob 1 1/8 in. diameter, 5/8 in. high, depth of hole 7/16 in.

691. Rectal syringe pipe 2 1/4 in. long with opening somewhat less than 1/8 in. diameter

692. Push-on type bar knob with spring. 1 3/8 radius

694. Radio knob 1 1/8 in. in diameter, 9/16 high with directional arrow

695. Radio knob the same as 694 without arrow

696. Radio knob of the push-on type 1 in. in diameter, 5/8 in. high

698. Push-on type radio knob with spring 7/8 in. diameter, 7/8 in. high

699. Control ball 3/4 in. in diameter. Push-on type with spring. 1 in. diameter, 5/8 in. high

700. Automatic tuning knob. Push-on with spring. 1 in. diameter, 5/8 in. high

701. Same as 698, but 3/4 in. diameter and 3/4 in. high

702. Bar knob 1 1/8 in. in radius. 5/8 in. high with directional arrow

703. Bar knob 5/8 in. in radius, 5/8 in. high. Directional arrow

704. Decorated molded closure 3/8 in. in diameter, 11/16 in. over-all height

705. Molded cap for connecting wires with brass insert. "110 volts AC-DC" molded on top. Almost 1/2 in. in diameter

706. Threaded ball closure 7/16 in. diameter

707. Push-on type knob with spring to fit flat shaft. Diameter 7/16 in., 7/16 in. high

Address all inquiries to Stock Mold Department, Modern Plastics, Chanin Building, N. Y. C. All molders are invited to send samples from stock molds to appear on this page as space permits

Technical Section

PLASTICS PROGRESS DURING 1938

THE CURRENT DEVELOPMENTS IN NEW MAterials, processes and applications resulting from the continuous and fruitful investigations underway in research laboratories have been set forth month by month during the past year on these pages. We have read of new molded reflectors for highway lighting, printing type made of thermoplastics, possibilities of soybean protein compositions, use of plastics in structural parts of aircraft, and of synthetic polymers with rubberlike properties. Because of the natural interest in these original trends, concurrent progress in those plastics which comprise the bulk of present day synthetic plastics production is sometimes overlooked. We believe that an annual inventory of technical developments in the "bread and butter" plastics will serve to provide a more balanced view of progress in the industry. These reviews can best be written by technical members of the firms which are actively engaged in the manufacture of these plastics and hence are well posted on what is being done. We are accordingly happy to acknowledge the ready collaboration of the well known chemists and engineers who have prepared the following surveys in the particular fields in which they are experts.

Perhaps it is fitting in this introduction to a review of plastics progress during 1938 to mention the very evident increasing consciousness of the desirability of cooperation in the industry to promote and direct into proper channels the inevitable expansion of the uses of plastics. These sentiments have been summed up by one author in the statement that "the plastics industry should recognize that by cooperative effort it can profitably and effectively inform the public regarding plastics so that they will know them just as they do metal and wood, will give them credit for their many qualities, and will ask for them by name," and by another who believes that we "should conduct organized research into the fundamental problems connected with plastics in order that their use will give minimum disappointment and maximum satisfaction to all concerned and that, where possible, means of correlating and coordinating existing efforts should be sought." Progress in this direction in our country has certainly been made during 1938 in the steps toward a constructive program taken by the Society of the Plastics Industry and in the standardization activities of the recently organized Committee D-20 on Plastics of the American Society for Testing Materials which will provide essential tools and data for both producer and consumer. There have been instances of apparently unreasonable secrecy and censorship, but there is reason to believe that the trend is toward a more "open door" policy on manuscripts concerning plastics developments and that through a freer interchange of fundamental information, plastics will continue to be worthy of its reputation as a progressive, typically modern industry. G. M. K.

PHENOLIC RESINS

by A. J. WEITH
BAKELITE CORPORATION

Phenolics, the backbone of the industry (Masson, Mod. Plastics 16: No. 2, 42), continued to maintain the number one position throughout 1938. Theoretical studies by Megson and his associates (J. Soc. Chem. Ind. 57:189–97) emphasized the importance of time-resinification curves on the composition of resins. The mechanism of polymerization is discussed by Kozlov (Org. Chem. Ind. U.S.S.R. 208–9), and the structure of resins by G. Meyer (Mat. Plastiche 5:15–17). The effect of impurities, such as cresol, resorcin, hydroquinone and the hydroxy derivatives of diphenylmethane, on the crystallization reactivity of resins has been studied by B. Maxorow (Prom. Organ. Chimie 3:140–3). A review of the historical development of phenolics is contained in a lecture by Wordell (Oil & Colour Trades J., Feb. 1938, p. 432), and a general review in a paper by Halfacre (Oil & Colour Trades J., July 1938, p. 101). The dielectric properties of phenol-, meta-cresol- and meta-5-xylenol-formaldehyde resins are given in the Brit. Elec. and Allied Ind. Res. Assoc. Technical Report L/T 89.

Further general reviews on phenolics are given by Seebach (Chem.-Ztg. 62:569–71), by Morgen and Pettet (J. Soc. Dyers & Col. 54:17–23), by Meharg (Trans. Electrochem. Soc. 74:9). Resin production at General Electric in Pittsfield is described by Lee (Chem. & Met. Eng. 45:130–1), and at Bakelite Limited by Plastics (Nov. 1938, pp. 364–71). Methods for determining the melting point of solid resins have been investigated by Fonrobert and Bruckel (Farben Ztg. 43:497–8) who prefer the glass capillary method, while Esch and Nitsche (Kunstharze und andere plastische Massen. Wiss. Tech. 8:249–50) have devised a method for isolating resins from fillers by heating in naphthol. Bromination as a con-

trol method for novolak and resol resins is recommended by Petrov and Smirnova (Prom. Organ. Chimie 3:153–8).

New cast phenolics are described in B. P. 488,183–4, while casting resins containing added urea form the subject of German patent 656,949. A process for pigmenting resins by precipitation of calcium lactate is disclosed in U. S. 2,122,270 and, according to B. P. 481,069, the discoloration of phenolics can be prevented by treatment with nitrous acid. Considerable interest was evidenced in filler-free transparent resin molding materials. Schmitz (U. S. 2,124,532) describes such a material, as do Weelands (U. S. 2,120,585), Nowack and Hessen (B. P. 649,212) and Bakelite Ltd. (B. P. 482,943).

A variety of articles dealing with phenolic molding materials have appeared during 1938. Nitschen and Salewski (Mitt. deut. Materials prüfungsanstalte Sonderhefte 32:43–54) studied the stability of non-laminar heat-pressed phenoplastics which differed only in the type of filler, and concluded that a comprehensive characterization requires a properties vs. temperature diagram. A review of phenolic impact materials is given by Lehr (Kunststoffe 28:56–9), and of the general molding phenolics by Kuntze (Kunststoffe 28:105–9). Novolak resins suitable for molding compositions are described by Petrov, et al. (Org. Chem. Ind. U. S. S. R. 119–22), while a second article (ibid., pp. 122–5) describes their purification by washing with water. Halls (Plastics, May 1938, pp. 166–7), discusses phenolic molding materials for electrical purposes.

The patent literature describes a variety of new molding materials. Thus B. P. 480,704 discloses the use of fluorspar meal as a filler, while in B. P. 480,607 a phenolic resin suitable for molding is condensed under conditions which preclude the dehydration to produce a resinous composition having the water of the reaction mixture distributed therein. U. S. 2,121,844 and U. S. 2,128,894 disclose phenolic molding compositions containing cork as a filler. Molded phenolic insulators having a surface of urea plastic are the subject of Danish patent 54,881, while in U. S. 2,105,269 animal blood is mixed with a phenolic resin and wood flour. Flowability of phenolic molding material is improved by the use of hydrogenated diphenyls (U. S. 2,115,524), while in German patent 653,959 a molding powder containing hydrogenated phenol or cresol is recommended. Elbel (B. P. 486,690) and Cserny (U. S. 2,137,568) describe new phenolic molding powders, and a cold molding composition is disclosed in German patent 655,695.

Well-equipped libraries such as this are indispensible adjuncts to the laboratory in modern research. (Photo courtesy Bakelite)

Laminated phenolics "got around" (Mod. Plastics 16: No. 3, 54–5, 104) during the past year. G. R. Eyssen (Trans. Inst. Plastics Ind. 6:64–75) discussed their advantages when used as heavy-load slow-speed bearings. Lehr (Kunststoffe 28:161–70) states that in experiments with molded bearings, phenol laminated proved most efficient, while Heidebrook (Kunststoffe 28:200–2) and Graef (Iron Age 141:50–5) also stress their good qualities. A review of laminated phenolics is given by Dregmann (Nitrocellulose 9:82–3). Their use in aeroplane construction is reviewed by Küch (Kunststoffe 28:262), and for electrical purposes, in Plastics 2:306–9. In this latter field, U. S. 2,135,349 describes forming an insulation material by impregnating vulcanized fiber with phenol and formaldehyde and B. P. 486,534 an insulating material of phenolic laminated, while in U. S. 2,110,975, a phenolic laminated is faced with acetate. Their adaptability to the needs of the textile industry is discussed by Beha (Plast. Massen 8:106–8), while U. S. 2,128,097 discloses a spinning bucket of laminated phenolic. These materials have also proven useful for helmets (B. P. 481,437) and for projectiles (B. P. 484,428).

Phenolic plywood materials have steadily expanded their field of usefulness. This is discussed by Stout and Brew (Mod. Plastics 15: No. 7, 39–40), while a new method for making plywood involving the impregnation of veneer as it is peeled from the log, is the subject of an article in Mech. Eng. 60:328. A technic for the bonding of thick-walled non-dried wood is given by Dietrich (Kunststoffe 28:208–11). Recent patents relating to phenolic plybonding materials are as follows: B. P. 479,901 relating to the use of liquid phenolic resins, and B. P. 493,302.

Phenolic resins for a number of miscellaneous uses have been patented or mentioned in the literature. According to Ger. P. 662,192 and B. P. 492,811, phenolics have been combined with rubber, and in B. P. 478,988, with polyhydric alcohol. In B. P. 484,118, partial acetates of polyhydric alcohols plus boric acid are added. U. S. 2,121,917 discloses phenolic resins condensed in an alkaline medium containing sulfur, while in U. S. 2,110,-077, phenolics are heated in the presence of branch chain alcohols. Lauter (U. S. 2,108,341) reacts a phenolic with an alkyd and adds a metal halide to prevent oxidation. In B. P. 644,708 a phenolic is reacted with a non-aromatic amine. Condensation products of aromatic aldehydes and phenols are discussed in Prom. Organ. Chimie 3:210–2, while alkali soluble phenols are described in B. P. 485,230.

An embalming fluid containing a phenol is the subject of U. S. 2,113,842, while B. P. 482,016 relates to printing plates of phenolic; B. P. 478,974, French 823,412 and U. S. 2,110,571, to friction elements. The use of phenolics, polymerizable in the cold, as construction materials, is discussed in Org. Chem. Ind. (U.S.S.R.) 5:44–

Intricate electrical testing apparatus is necessary in the development of better, more resistant resins. (This equipment is in the Bakelite Laboratory)

50, and a phenolic bonded sandpaper is described in U. S. patents 2,123,062, 2,129,954, 2,124,055 and in 2,124,666. The usefulness of phenolic resins to increase the density of castings is discussed in Automotive Ind. 79:85, while Dike (U. S. 2,120,549) gives a process for making powdered phenolics. Suitable wood coverings are obtained by treating wood with a solution of hardenable phenolic according to U. S. 2,114,784. What to expect of phenolic dentures is discussed in J. Amer. Dent. Assoc. 25:243–52, and a suitable phenolic is disclosed in U. S. 2,138,795. The absorption properties of phenolics have been studied by Akeroyd and Broughton (J. Phys. Chem. 62:343–52), and by Ismuta (J. Soc. Chem. Ind. Japan, Suppl. binding 41:129–32).

Phenolics suitable for coating compositions, either as such or in combination with oils, have been widely used, and a discussion of their advantages has formed the subject of a number of papers. Trevy (Rev. Gen. Mat. Plastiques 14:11–5) relates the factors influencing oil solubility; Redfarn (Drugs, Oils & Paints 53:170–2) is concerned with their properties from the point of view of functionality; Petrov and Smirnova (Prom. Org. Chim. 5:336–8) modify the phenolics by including oxidation products of drying oils; Honel (J. Oil & Col. Chem. Assoc. 21:247–9) reviews the heat-hardenable type of oil-soluble phenolics. Bowman (Paint Manuf. April 1938, p. 32) and Zeidler and Weghofer (Paint & Varnish Production Mgr. 53:328–31, 348–9) give a general summary of the status of phenolics.

Patents relating to phenolic oleoresinous compositions are varied, as are the uses to which such compositions are put. In German patent 656,249, B. P. 478,589 and B. P. 492,731, zinc or zinc salts are used as catalytic agents, and in B. P. 477,954, U. S. 2,121,642, U. S. 2,123,898 and U. S. 2,131,757, phenolics are combined with terpene-like materials. B. P. 479,350 describes reacting phenolics with carboxylic substances of high molecular weight; U. S. 2,130,124 relates to the use of phenolics with blown oils; U. S. 2,124,285, to the use of linolic acid and rosin, while in B. P. 485,384, phenolics and drying oils are reacted in the presence of aluminum. B. P. 492,700 discloses a combination of phenolic and naphthenic acids, B. P. 490,040 the use of hydrogenated phenol-aldehyde resins; while Ellis (U. S. 2,137,240) prepares oil-soluble resins from xylenol. B. P. 492,479 discloses can coatings based on oil-soluble phenolics.

Finally, just issued is Report No. 131, published by the U. S. Tariff Commission, Washington, D. C., which contains an excellent, complete and well illustrated review on phenolics.

UREA-FORMALDEHYDE RESINS

by M. H. BIGELOW
PLASKON CO., INC.

UREA-FORMALDEHYDE RESINS HAVE MADE DISTINCT advances in 1938 along three fronts; namely, improvements and expansion of uses of molding compounds, development of improved protective coatings, and further displacements of animal and casein adhesives.

In the molding field there has been a definite increase in the use of urea plastics for staple rather than novel items. A sharp increase has been apparent in the size and number of molded radio cabinets. Pioneering in the field of built-up sets, a new scale housing has been developed consisting of several molded parts assembled into a complete rigid unit, opening a new technique for the production of intricate shapes.

A decided improvement in optical efficiency has resulted in phenomenal gains in the amount of urea plastics for molding illuminating diffusor bowls. The production on a commercial scale of reflectors $26^1/_2$ inches in diameter indicate that plastic diffusors are not to be limited to small sizes. There is a distinct tendency for lighting manufacturers to offer the same styled reflectors in a series of diameters, ranging from 12 to 27 inches. Outstanding in novel lighting application is the use of urea-plastics louvres for transportational illumination. Continuous plastic louvres combined with translucent urea-laminated strips give added illumination with no increase in the number of lamps and no objectionable bright spots. Urea pockets coupled with magnifying glass lenses have appeared in several of the new trains put into service this year. With the advent of the fluorescent tube, new plastic designs taxing the average imagination are indicated.

An outstanding application of urea plastics is for tiles. With the numerous colors available these tiles are suitable for bathrooms, kitchens, hallways and walls of public buildings. These tiles are offered with a simplified method of application. This use marks an important step in the employment of plastics for architecture.

While there has been little change made in the physical properties of the urea plastics, one property, known for some time, has received practical recognition. Urea plastics are electrically "non-tracking" even after long exposure to salt solutions. Although the surface may appear to deteriorate after repeated severe arcings, the plastic will not conduct an electric current. In this respect they are unique among plastics and the gain in use in this field is approaching that of lighting. With

the increasing popularity of automatic trip breakers where repeated arcings take place, the demand for ureas will necessarily increase. The application of urea plastics for lighting, tiles and electrical appliances insure them a permanent position in the catalog of industrial fabricating material.

Paralleling the advances of urea molding compound, are the achievements made during the year in the production of urea-formaldehyde lacquers, textile assistants, and laminating syrups. Urea lacquers have been received with favor in the coating industries because of the possibilities of improved color, better resistance to solvents and greases, coupled with resistance to heat and weathering. Air-drying urea lacquers have appeared this year and round out the suitability of these coatings. There has been an increased use of urea-formaldehyde condensation products for improving the crease and acid resistance of fabrics.

Urea-formaldehyde syrups are finding widespread application for laminating not only cellulose products but fabrics as well. Translucent panels have entered the lighting field where it was impractical to resort to compression molding. Veneers embodying the combination of wood surfaced with urea laminate are being used architecturally.

Pushed into prominence this year are the urea-formalin adhesives. The water resistance of urea-formaldehyde bonds has increased the usefulness of plywood. While formerly restricted to limited indoor uses, laminated wood now finds universal application. With the possibility now of applying urea surface veneers, combined with urea bonds, the architect has a new and valuable building material, both for exterior and interior usage.

The achievements for 1938 have proved the merits of urea plastics and have given designers, architects and engineers increased confidence in a material which just a few years ago was in a test-tube infancy.

Publications

Gluing of Wood with Synthetic Resins, by O. Kraemer. Aircraft Engineering, 10, 183–6.

Crease-Resistant Finishes, by C. I. Wall. Textile Manufacture, 64, 164–7.

Beckamine Resins for Surface Coatings, by Hodgins and Hovey. Paint, Oil and Chemical Review, 100, No. 12, 30–1, 35.

Signs from Plastics, by E. Wirth. Kunststoffe, 28, 67–9.

Synthetic Resins as Lacquer Raw Materials, by A. Greth. Kunststoffe, 28, 129–39.

Translucent Urea Laminates, by W. H. MacHale. Modern Plastics, 16, No. 2, 266–8.

Synthetic Resins applied to Textiles, by Powers. American Dyestuff Reporter.

Plastics in Lighting, by F. W. Warner. Trans. Illuminating Eng. Soc., 33, 244.

Thermosetting Resins, by V. E. Meharg. Electrochemical Society Preprint, October 1938.

Plastics and Electrical Insulation, by L. Hartshorn, N. J. L. Megson, and E. Rushton. J. Inst. Elec. Eng., 83, 474–96.

Urea-Formaldehyde Film-Forming Compositions, by Hodgins and Hovey. Ind. Eng. Chem., 30, 21–9.

Recent European Developments in Manufacture of Synthetic Resins, by H. Pincass. Paint and Varnish Prod. Mgr., 18, 48.

Sound Foundations, by J. M. Sanderson. Paint and Varnish Prod. Mgr., 18, 52–4.

Amino Plastics Moldings for Electrical Purposes, by E. E. Halls. Plastics, 2, 238–9.

Non-Tracking Plastics, by P. Kemp. Electrical Review, 122, 840.

Urea Molding Compound, by W. N. Shepard. Modern Plastics, 16, No. 2, 98–100, 104.

NUMBER			
		U. S. PATENTS	
2108113	2-15-38	K. Eisenmann and H. Scheuermann (to Plaskon Company)	Urea Resin.
2109291	2-22-38	A. G. Hovey and T. S. Hodgins	Urea - formaldehyde coatings.
2113485	4-5 -38	Ignaz Kreidl	Sulfurized urea resin.
		FRENCH PATENTS	
823891	1-27-38	I. G. Farbenindustrie	Urea-formaldehyde sulfamides.
823510	1-21-38	Willy Frick	Certified teeth.
		BRITISH PATENTS	
482254	3-25-38	W. Fellers	Crease resisting fabric.
483339	4-20-38	E. I. du Pont	Urea lacquer.
477964	1-10-38	A. Rosenthal	Laminated materials.
47950	2-2- 38	Bakelite Gesellschaft	Urea-formaldehyde condensation product.
480704	2-28-38	Bakelite Limited	Improved synthetic molding compound, mineral fillers.
483571	4-21-38	L. A. Lantz-A. L. Morrison-Catro Printers Assoc.	Treatment of textile fabrics.
484959	5-12-38	Atlas Powder Company	Cast synthetic resin.
486146	5-31-38	M. Kraus	Powdered horn molding compound.
487298	6-17-38	I. G. Farbenindustrie	Binding agent for coatings.
488686	6-12-38	Kalle and Company	Colloidal urea-aldehyde condensate.
491857	9-27-38	A. H., and E. E. Walker	Urea-aldehyde resins.
482281	3-22-38	D. E. Edgar and E. I. du Pont	Urea-formaldehyde coating.
482159	3-24-38	T. A. Wardle and C. M. Keyworth	Textile treatment.
484415	6-5 -38	H. D. Elkington	Urea-formaldehyde condensation product.
487253	6-17-38	A. Carpmaal	Condensation product.
482897	4-7 -38	I. G. Farbenindustrie	Formaldehyde - urea-acrylamide resins.
490931	8-22-38	D. E. Edgar-W. W. Smith-E. I. du Pont	Urea - formaldehyde lacquer.
2115550	4-26-38	C. Ellis	Low cellulose urea-aldehyde resin.
2116186	5-3 -38	A. Buschman	Urea-nitrocellulose lacquer for tobacco pipes.
2118549	5-24-38	J. D. Cochrane, Jr.	Laminated product.
2119189	5-31-38	G. Widmer	Pigment powder protection.
2119466	5-31-38	P. Michaut	Urea-formaldehyde varnish.
2121076	6-21-38	C. Ellis	Molding composition of urea resin carbohydrate
2121077	6-21-38	C. Ellis	Glass clear synthetic resin.
2121205	6-21-38	A. L. Lippert and W. P. Hall	Blueprint and photostating on paper and cloth.
2124151	7-13-38	H. S. Rothrock (to du Pont)	Urea resin solution.
2130427	9-20-38	F. M. Hoover	Molded toy.
2126677	8-9 -38	C. Ellis	Urea resin molding compositon; densification.
2111622	3-21-38	R. M. Goepp, Jr.	Cast urea resin.
2110489	3-8 -38	W. Kraus and W. Fisch	Urea - formaldehyde resin.
2128533–4	8-30-38	A. M. Howald	Molding techniques.
2125776	8-2 -38	C. Ellis, Jr. (to Plaskon Co.)	Molded horn products.

2126773	8-16-38	W. Heyn (to duPont)	Urea - formaldehyde-alkyd resin solutions.
2127894	8-23-38	T. Sutter	Amine resins.
		GERMAN PATENTS	
661126	6-11-38	E. Geistlich Soehne	Urea - formaldehyde adsives.
656949	2-22-38	L. Csermy	Cast Resenoids.
656964	2-27-38	N. Lubicz	Urea-formaldehyde condensation product.
		CANADIAN PATENTS	
375452	8-2- 38	H. L. Bender and H. A. Hoffman (to Bakelite Corp.)	Urea resin.
385479	8-2 -38	D. E. Edgar C. I. I.	Urea-formaldehyde condensation product.
373876	5-17-38	W. Peacock, Jr.	Temporary coating for polished surfaces.

LAMINATES

by R. W. AUXIER and E. R. PERRY

WESTINGHOUSE ELECTRIC & MFG. CO.

IN REVIEWING THE LITERATURE AND DEvelopments of the past year in laminated plastics, it might be well to consider them under four heads, namely: chemistry, standards, methods of testing, and applications. Although the tonnage of phenolic and urea resins used in producing laminates has increased, knowledge of the chemistry of the reactions has hardly kept pace. Papers such as those by Megson[1] and Stäger[2] have contributed to a better understanding of the roles which different catalysts play in the phenolic resin reactions, and the course which such reactions take. While it has not been possible to write a simple equation which expresses the relation between the quantity of catalyst, the resinification time, and a velocity constant, the experimental curves have been a help in controlling the course of the reaction. Since solubility plays an important part in the measurement of the resinification time, a study made by Megson[3] is of great interest.

Laminated plastics of the phenolic type have been used for several years in large quantities by the electrical industry. It is only within the last few years that electrical properties and molecular structure in combination with chemical composition have been correlated. Stäger some years ago published a paper in which he gave the variation in electrical properties with different phenol, cresol, and phenol-cresol resins. Hartshorn, Megson, and Rushton have published a paper[4] this year in which they do the same thing. They have gone even further in attempting to relate the electrical properties with the structure. It is interesting to note that the introduction of a methyl group in the meta-position on the benzene ring lowers the electrical losses. This substantiates the observations of Stäger, who found that the electrical losses decreased with increasing meta-cresol content.

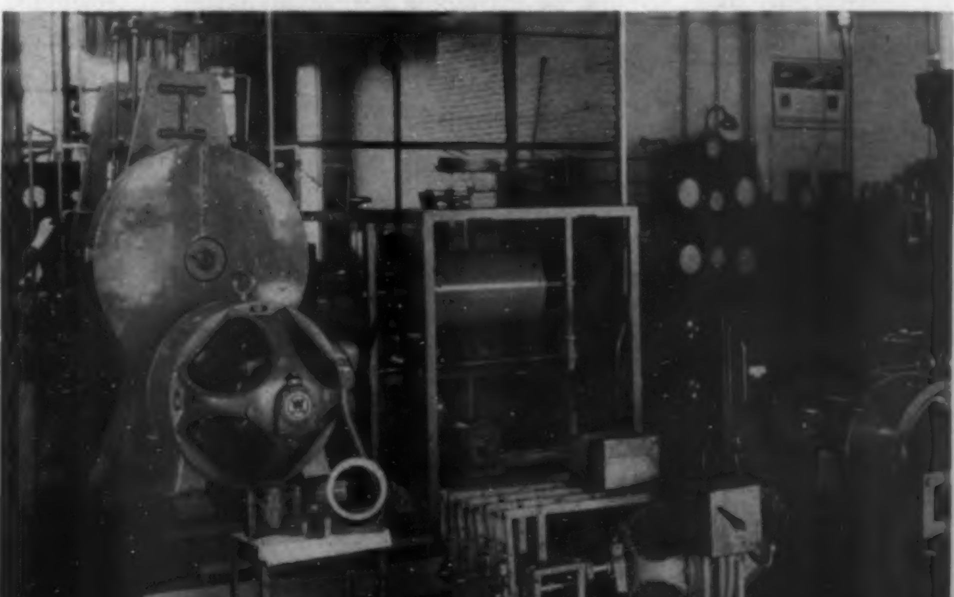
The course of the urea aldehyde reaction and the products formed has received the attention of Bass.[5]

An improved understanding of the reactions and closer control over the quality of the products has aroused greater interest in the establishment of standards for laminated and molded materials. To this end, England[6] and Germany[7] have started the publication of specifications for standards. The American Society for Testing Materials Committee D-20 on Plastics is actively engaged in establishing standards in this country.

The establishment of standards always brings up the question of tests and methods of testing. This phase of the work has received considerable attention during 1938. Papers dealing with impact testing,[8] hardness testing,[9] and permanence of plastics[10] have been delivered before the A.S.T.M. Other papers[11,12] dealing with methods of testing plastics have appeared. In regard to expansion measurements and the effect of heat treatment on plastics, the observations of Boutaric and Engeldinger[13] are interesting. These more exact measurements of expansion characteristics and the effect of heat treatment should allow the manufacture of molded plastic parts to closer tolerances.

The diversity in the applications of plastics has increased steadily. The past year plastic bearings have received considerable attention. In Germany a symposium was held, setting forth its industrial experiences with bearings of this type.[14] England, too, has been interested in such bearings.[15] The use of laminated plate for decorative purposes has been made easier by the publication of methods for installing such material.[16] Two new decorative laminated materials have appeared during

Laminated bearings are subjected to rigid tests simulating actual service conditions on machines like the one at the left. Specialized molding equipment (right) is used in the production of long-wearing, economical bearings. (Photos courtesy Westinghouse)



the past year, one having a surface lamination of genuine wood veneer impregnated and molded in the regular manner. The material is available in practically any known wood, either foreign or domestic. The other is a flexible sheet having a surface hardness equal to regular laminated, but capable of being veneered on forms with as little as three-inch radii of curvature, either convex or concave, to the surface.

The raw materials which are used in the production of urea-formaldehyde resins employed in the manufacture of laminated plastics are now made synthetically. Product uniformity, therefore, has been greatly improved. The major portion of phenols used to make resins in the past have come from the by-product distillation of coal. The past year has seen further commercial development of synthetic phenols, outstanding among which is para-cresol. Recovery of phenols from cornstalks[17] may lead to another farm by-product finding a place in industry.

It is obvious, in the over-all plastics picture, that production has completely outdistanced contributing factors, such as control, methods of test, standardization, etc. This seems perfectly natural for a material which has been greeted by such popular demand. It is, however, a dangerous condition for future stability and progress in the industry. An encouraging note is the fact that Govermental institutions are taking the lead in improving this condition through research and publications covering fundamental information.

American Cyanamid's new Stamford laboratories typify the industry's acceptance of well-financed, highly-equipped research as a basic necessity in continued progress in development of new and better materials

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ALKYD RESINS

by H. J. WEST

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ALTHOUGH THE USE OF ALKYD RESINS IS PLAYing an ever increasing part in the paint, lacquer and varnish industry, the developments of new alkyd resins during 1938, at least insofar as they have been made public through patents and trade announcements, have been relatively few in number. Many patents issued during the year cover minor improvements in methods of manufacture or application but provide no advances of a fundamental nature. However, the reason for this apparent dearth of new products is easy to find. For many years the tempo of development has been so extremely fast that little time has been given to the protective coatings industries to digest the output of research men working in this field. It was inevitable that the tempo would slacken and that industry would be enabled to evaluate properly the coating compositions available and to sift out those most suited to its requirements from both considerations of economy and of durability.

In spite of the serious depression during the first nine months of the year, the field of application has broadened and it is safe to predict that of all the resins used in protective coatings a greater percentage will have been represented by alkyds during 1938 than ever before. Their use has spread into the field of printing inks where the rapid solvent release of certain types is of great value in the development of fast-setting inks for the new super-speed presses. Many articles have appeared, particularly in Germany, regarding improvements in emulsion paints[1] and the use of alkyds in such paint emulsions is well established in this country, especially on the West coast. There has also been a greater use of alkyd resin enamels for interior decorating, particularly for architectural white finishes. A new and interesting article by Dr. Otto Jordan discusses briefly the possibility of using oil-soluble styrene resins in conjunction with alkyds for formulating decorative finishes.[2]

From the alkyd resins now marketed it is possible to select a few from which the trade can formulate coatings for practically every condition encountered throughout the country and to meet all kinds of application schedules. For each resin there is one application to which it is particularly suited, but by blending one with the other

or with resins of a different type such as the phenolic modified alkyds the field of use is greatly broadened. This has been accomplished by refinements in manufacture leading to faster drying in both the aromatic-solvent soluble types and in those requiring only weak petroleum spirits as solvent. Oil modified pure alkyd resins are now available as solutions in petroleum thinners and requiring nothing but petroleum spirits for solvent formulation that will air dry hard enough in relatively thick films in less than twenty-four hours to withstand taping without imprinting.

For applications where maximum resistance to discoloration and wear is required the alkyd resins outstanding in this respect can be improved greatly by blending with a urea-formaldehyde resin and the phenomenal increase in the use of this type of resin during 1938 for formulating coating compositions has served to divert attention from the alkyds. Although we have referred to the addition of urea-formaldehyde resins to alkyds, it is more usual to regard the resulting products as alkyd-modified urea-formaldehyde resins, and considerable effort has been devoted to the development of alkyd resins that will have the maximum flexibilizing effect on the inherently brittle urea-formaldehyde type with the least sacrifice in hardness. In this the resin manufacturer has been highly successful and alkyd-modified urea-formaldehyde resins are now available from which enamels can be formulated to produce baked finishes with all the beauty and hardness of the urea resin and the gloss, adhesion and flexibility usually associated with alkyd resins. The development of suitable alkyd modifying components has been an outstanding contribution to the success of urea-formaldehyde resins during 1938.

In reading the trade journals of the paint, varnish and lacquer industry one cannot help but notice the large number of advertisements stressing baking schedules of 15 minutes or less, and, in most cases, the drastically reduced curing time to obtain hard mar-proof coatings is achieved through the use of an enamel containing an alkyd-modified urea-formaldehyde composition.

In concluding this extremely brief review we cannot omit reference to the widely publicized nylon recently announced by the du Pont Company.[3] Although not strictly an alkyd resin, nevertheless, it may be regarded as of the same general class; instead of the esterification of a polybasic acid with a polyhydric alcohol as a basic reaction, the condensation of a polybasic acid with a polyamine is involved, and the knowledge gained by fundamental research into the relation between the structure and the properties of the alkyds has, undoubtedly, contributed largely to this development. While we cannot be sure just what fields this synthetic fiber will invade and conquer, we do know that its effect on the textile industry will be profound and that coating compositions may later be evolved. It is a comforting thought to the American citizen that this country's achievements in the chemical industry are not yet brought about by the pressure of military necessity, but that the fields of research peacefully broaden "from precedent to precedent."

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THERMOPLASTIC RESINS

by M. L. MACHT and H. W. PAINE

E. I. DU PONT DE NEMOURS & CO., INC.

THE PURPOSE OF THIS REVIEW IS TO POINT OUT very briefly the most important fields entered by thermoplastic resins during 1938; to emphasize their versatility through describing some of their novel[0] uses; and to supply a bibliography which will enable the interested reader to obtain a comprehensive detailed picture of current developments in the fields of vinyl, styrene, acrylic and methacrylic resins.

Increased use of injection molding during the past year has offered added impetus to the improvement and development of thermoplastic resins. The advent of high capacity molding machines[1,2] assures future tonnage usage of such materials by increasing their field to include large as well as small articles. Whereas earlier machines were limited to approximately two ounces, today eight ounces is considered feasible for a single-cylindered machine, and multiple-cylindered apparatus makes possible any conceivable economical piece.

The development of a new safety glass interlayer of superior toughness[3] is also of outstanding importance to the plastics industry, and has been the reason for the construction of extensive new plants.

The adaptation of thermoplastic resins to the field of electric wire insulation is of wide general interest, wire coating by extrusion[4] as well as by solution[5] methods having reached the production stage.

In addition to these specific major developments, the literature for the year has carried interesting reviews of the American plastics industry;[6] of British patents dealing with the ethenoid resins;[7] of new applications of injection molding;[8] of properties of resins;[9] and of the ideal plastic;[10] a general review of the various types of plastics;[11] and a discussion of the behavior of resins of the newer types toward acids, alkalis, oxidizing and reducing agents.[12]

Vinyl

The bringing to large scale commercial production of polyvinyl acetal resin,[3,13,14] primarily for use in

Polyvinyl acetal plastics, developed for interlayers in safety glass, has high stretchability and moisture resistance. (Photo courtesy du Pont)

Methacrylate tubes and other forms are buffed and polished to bring out their inherent clarity with special care because it is a thermoplastic material. (Photo courtesy du Pont)

safety glass, has been an outstanding feat. Smaller quantities of such polyvinyl acetal resins have been used in molding powder where they are of particular interest on account of their rigidity and toughness, although they have inferior resistance to moisture and rather low softening temperatures, and are not outstandingly good in color. The production of extremely high softening polyvinyl acetal wire coatings for deposition by the dipping method[5] offers such great promise that it bids fair to completely revolutionize the wire-enameling industry.

Plasticized polyvinyl chloride,[4] similar in nature to the product which was offered several years ago for melt coatings, has been applied to wire in the form of an extruded insulation of comparatively permanent flexibility.

Polyvinyl alcohol plastics of a rubbery nature, having excellent resistance[15] to oil and to organic solvents of some types, have been commercially offered for the first time in the form of tubing, hose, gloves, etc.

Reviews of polyvinyl resin production;[16] preparation of polyvinyl acetate;[17] and properties as well as application of some of the vinyl resins[18] have appeared.

Styrene

Styrene, on account of its excellent injection moldability, has reentered the American market. Abroad, a synthetic rubber substitute,[19,20] prepared by interpolymerizing it with other materials, has appeared. Plastic type, presumably of polystyrene, has been suggested as a replacement for metal,[21,22] though such usage might be considered as questionable except as a result of an artificial economy which might result in a shortage of metals.

Methods of polymerizing styrene[23,24] have appeared in the literature, as have reviews of its electrical applications[25] and other properties.[26]

Acrylates

A wide variety of acrylate emulsions[27] has been offered to the trade for waterproofing, fabric finishing, and related uses.[28,29] Emulsion type paints,[30] presumably acrylic, which are used to replace the more conventional drying oil types have made their appearance. Assuming satisfactory properties, it is questionable as to whether such emulsions can compete with vegetable oil coatings in an unrestricted market.

Acrylate-vinyl interpolymers[31] useful to some degree as a non-inflammable substitute for pyroxylin plastics in the form of sheets, tubes, and rods, have been reported. They are considered more adaptable, however, for corrosion-resisting piping.[32] In a highly plasticized condition, they are reputedly of interest for extruded insulation on electric wires.

Several publications of general interest outlining properties[28] and, in some cases, compositions,[31,32] have appeared. In general, the literature tends to group the acrylates and methacrylates together, while for purposes of this review a distinction is being made.

Methacrylates

Methacrylate resins are finding wide favor for a number of new uses, resulting in greatly expanded production. Airplane quality sheeting,[33] novelty fabricating sheeting, molding powder, and rods and tubes, have all attained widespread usage. Marked advances have been made in the injection molding characteristics of methacrylate compounds, as well as in the improved quality of the final injection-molded pieces.

Methacrylic ester resins have come into use in the formulation of coating materials, and are reported as being particularly effective in clear lacquers, such as are used to prevent tarnishing of metals.[34] Their properties have been the subject of several publications.[35] They have been recommended as adhesives,[36] for use in textile treating, or finishing compounds,[37] and as stiffening agents for semi-stiff collars.[38]

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CELLULOSE ESTERS

by J. M. DEBELL, C. S. WEBER and C. K. BUMP
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THE OUTSTANDING FEATURE IN THE 1938 FIELD of cellulose esters was the continued phenomenal growth of cellulose acetate molding powder for both compression and injection molding. The October production is reported as over one million pounds, which now reaches the same order of magnitude as the consumption of cellulose acetate in sheets, principally for safety glass plastic. Cellulose nitrate has been an unspectacular but steady performer following the general business curve; while the cellulose mixed esters have begun to attract more attention on account of their improved water resistance properties as compared with cellulose acetate.

Several factors have been important in the expansion of molding compounds against the business trend: injection molding machines have been improved in performance and capacity, now delivering up to two pounds per injection; the flow characteristics of the powders themselves have been brought under stricter control so that more dependable operation has been assured; and the appeal of such a magnificent range of colors and mottles has led many manufacturers to adopt these products to give additional attraction to their customers. Pieces now regularly molded from acetate plastic include steering wheels, automotive parts, panels, bezels, instrument cases, frames, radio grills, toys, ornaments, handles, toilet seats, building hardware, window trim, flashlight cases and business machine parts. Transparent oil cans qualified for one of the Modern Plastics Competition awards.

The efforts of the technicians in this field have been principally directed toward meeting an ever widening list of special requirements as to transparency, weather resistance, cold resistance over inserts in the automobile steering wheels, and improved molding cycles. The last have been attacked principally by adjustment of the flow of the thermoplastic at various temperatures, and characteristic curves summarizing this quality have proven immensely useful in adjusting plastic to particular molds. While standard formulations are satisfactory for most purposes, new odorless, tasteless and nontoxic acetate plastics are now available where required. These can be submerged in water for long periods without imparting objectionable tastes. Improvements in process of manufacture and new plasticizers continue to play a considerable part in the patent literature.[2,3]

In the safety glass field, the acetate plastic production was somewhat restricted in the early part of the year, not only on account of the lower automotive requirements but also because considerable stocks had been built up in the hands of the motor companies and the glass companies. This situation, however, corrected itself at midyear and the production has resumed with its accustomed vigor. The use of vinyl acetal resins continues to grow, however, and it appears probable that there will be a gradual transition away from the acetate to this type of material in the making of safety glass.

Meanwhile, the gap between cast thin film and the thicker continuous safety glass plastic is being filled by a much more extensive use of continuously produced heavy sheet (.003–.025") of good transparency, brilliance, gauge and toughness, which is finding extensive use in the packaging field. The full visibility of articles thus packaged has enhanced sales, as expected.

The superior water resistance of cellulose acetate-butyrate, coupled with lowered production cost, is giving this material more attention in the molding field. While it is somewhat more expensive than the acetate, it nevertheless compensates partially for this difference by a lower specific gravity, 1.21 against 1.27 in the molding mixture.

Cellulose triacetate has not achieved much commercial importance but methods of manufacture have been sufficiently improved so that it can become available as foil or as fiber for electrical insulation. So far, its plastic properties have not proven quite as satisfactory as those of the partially hydrolyzed acetate, but research and development efforts are continuing in this direction.

Much progress has been made during the past year in attaining cellulose acetate formulations for aircraft to give freedom from the inferior weathering qualities occasionally reported in the past. The newer formulations have given excellent promise in the experimental exposure tests, so that improved weathering is now added to the previous advantages of toughness and simplicity of assembly. In addition to this use in sheet form as windshields on aircraft, the application on the cellulose organic esters as dopes for fabric-covered airplanes has been investigated.

Cellulose nitrate production continues to maintain a steady volume which has generally followed the business cycle, both in lacquer and in plastics. The trend toward increased use of wood pulp as a raw material continues as the wood cellulose is brought under better control and means of handling it are perfected. While cellulose nitrate does not have the intensive research programs of the other esters, work is, nevertheless, going forward steadily toward methanol-soluble material for film casting,[10] production of low viscosity cellulose nitrate directly from low viscosity cellulose,[9] new plasticizers,[8] and especially attempts to use cellulose nitrate in small quantity as a toughening agent for other resin and film-forming materials. It has found increasing use as a toughener for blown castor oil in artificial leather, alkyd resin combinations, and has even been proposed as a toughening agent for methyl methacrylate.[11]

The prospect for the current year is, therefore, that cellulose nitrate will continue staple production, expanding with the business cycle; molding compounds from cellulose acetate and related esters can be expected to extend their rapid growth; safety glass plastic from acetate will probably gradually be replaced by the polyvinyl acetal or similar resins; and cellulose ester plastic, in new uses and in larger pieces, will find greatly increased application throughout industry, especially in automobiles, aircraft, and radio.

(*See summary of U. S. Patents on cellulose esters on next page.*)

SUMMARY OF RECENT U. S. PATENTS PERTAINING TO CELLULOSE ESTERS

Compiled by H. E. Nims

1. *Raw Materials for Cellulose Acetate.* A. N. Parrett and J. H. Holloway 2,105,498; G. A. Richter 2,112,115, 2,112,990.
2. *Manufacture of Cellulose Acetate.* H. A. Auden and H. P. Staudinger 2,110,642; L. E. Clement 2,104,023; Jos. B. Dickey 2,113,293; H. Dreyfus 2,106,297; H. Dreyfus and R. W. Moncrieff 2,122,793; C. R. Fordyce 2,129,052; R. Hofmann 2,126,190; C. J. Malm 2,105,252, 2,115,735, 2,126,487; H. E. Martin and D. A. Ensor 2,105,543, 2,105,544, 2,109,496; M. G. Milliken 2,105,609; G. F. Nadeau and L. K. Eilers 2,117,815; G. A. Richter 2,106,811; G. Schnieder 2,109,509, 2,109,753; A. Schuller, R. Trismans and S. Hendriex 2,119,116; O. Sindl and G. Frank 2,127,789; W. Whitehead 2,105,570, 2,126,851.
3. *Plasticizers for Cellulose Acetate.* B. Andersen and A. F. Caprio 2,115,700; W. H. Carmody 2,108,250; H. L. Cox and T. F. Carruthers 2,106,703, 2,132,679; H. Dreyfus 2,115,708, 2,115,709, 2,115,710; W. E. Gloor 2,128,136; G. D. Graves and R. E. Thomas 2,109,943; M. Hagedorn 2,132,160; R. A. Jacobson 2,126,113; L. P. Kyrides 2,120,755, 2,120,756; R. H. Lock 2,107,202, 2,107,203; L. W. A. Meyer 2,124,884; W. H. Moss 2,105,952; H. B. Smith 2,108,452, 2,117,827, 2,119,722, 2,126,510, 2,132,884.
4. *Cellulose Triacetate.* K. Werner 2,128,340.
5. *Cellulose Mixed Esters and Other Cellulose Esters.* E. Berl 2,125,880; C. R. Fordyce and J. Emerson 2,113,300; H. S. Gardner, Jr. 2,113,301; L. B. Genung 2,126,460; J. K. Hunt and G. H. Latham 2,113,653; C. J. Malm and C. L. Fletcher 2,113,304; C. J. Malm and L. W. Blanchard 2,132,871; G. W. Rigby 2,123,806.
6. *New Applications of Cellulose Acetate.* B. C. Bren 2,115,514; H. Dreyfus 2,118,840; W. E. Gloor 2,111,446; R. T. Haslam 2,129,735; R. W. Moncrieff and F. B. Hill 2,118,856; W. H. Moss 2,105,489.
7. *Manufacture of Cellulose Nitrate.* C. B. Hollabaugh 2,114,491; M. G. Milliken 2,105,609; F. B. Stieg 2,131,764.
8. *Plasticizers and Solvents for Cellulose Nitrate.* M. M. Brubacher and L. P. Hubbuch 2,121,684; H. L. Cox 2,122,129; J. W. Haught 2,109,587; L. P. Kyrides 2,126,560.
9. *Reduction of the Viscosity of Cellulose Nitrate.* S. I. Hoddeson and R. M. Meiklejohn 2,108,125; A. Noll 2,123,611.
10. *Methanol Soluble Cellulose Nitrate.* L. S. Baker, I. H. Morgan and R. J. Quaid 2,105,627; R. H. Talbot 2,118,275.
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CELLULOSE ETHERS

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General articles

During the past year, many general articles on the mechanism of cellulose reactions,[1] the chemistry of the cellulose derivatives,[2] and the effect of degree and uniformity of etherification of the cellulose ethers upon their physical and chemical properties[2,3,4,5,6] have come from the laboratories of large industrial concerns in this country. This is a natural by-product of the technological activity of domestic manufacturers in the production of high quality cellulose derivatives and the development of their uses. The principal result of these efforts has been to advance ethyl cellulose to its present stage of commercial maturity and interest to the plastics industry. The domestic production of ethyl chloride can be augmented to meet any requirement by combining ethylene from cracked petroleum gases with hydrochloric acid.[7,8]

The highly substituted organo-soluble cellulose ethers are of primary interest to the plastics, film, and coatings industries,[2,3] and are the only ones to be considered in this review. The water- and alkali-soluble products are finding uses in the textile industry as sizes and finishing agents, although their applications may expand into the fields of films and adhesives.[2] The ethers which are insoluble in the above solvent types are usually produced by modifying filaments or threads of cellulose and cellulose ethers and are of interest to the rayon industry.

Process improvements

Patented improvements in the etherification process including mixing cellulose with an emulsion of caustic soda and benzene to produce a suspension of alkali cellulose,[9] alkylation in the presence of a lower aliphatic alcohol in relatively large amount,[10] the use of an emulsifying agent soluble in benzyl chloride[11] as an aid in the preparation of benzyl cellulose which is insoluble in water or aqueous alkali at all stages of benzylation,[2] and the use of moisture conditioned cellulose.[12]

Improvements patented on the isolation of alkyl celluloses from the reaction mixture were a process of precipitation into cold water thus obtaining the ether in a finely divided state[13] and a process of flashing off unreacted alkyl halide while simultaneously dissolving the alkyl ether in a solvent of higher boiling point.[14] Also described were an improved process of isolating benzyl cellulose[15] and a method of making a cellulose derivative more easily separable from its colloidal suspension in a solvent-water mixture.[16] Procedures for improving clarity and color of crude cellulose ethers were claimed.[17]

New cellulose ethers

New types of mixed ethers with interesting properties have been described. Ethyl lauryl cellulose and similar mixed ethers may be prepared by alkylating a monoethyl cellulose with a halide of a fatty alcohol resulting from the hydrogenation of the higher fatty acid esters. These are said to be soluble in paraffin, kerosene, and other aliphatic hydrocarbons.[18] Ethyl methallyl cellulose is representative of a new class of unsaturated ethers which are readily converted by oxidation into materials insoluble in organic solvents.[19] The chlorination of alkyl ethers of cellulose is claimed to yield a nonflammable lacquer base material.[20] Mixed cellulose ethers partially soluble in water have been described as agglutinating materials suitable for use in making pencil leads.[21]

Solvents, plasticizers, resins

Solvents for ethyl cellulose have been evaluated on the basis of the clarity and mechanical properties of the deposited films.[22,24,25] Ethyl cellulose films of maximum tensile strength and elongation are obtained from alcohol-aromatic hydrocarbon solvent mixtures formulated in such a way that the hydrocarbon is the last solvent to evaporate from the film. Not only pure coal tar hydrocarbons, but also the aromatic naphthas such as the so-called "hydroformed solvents"[23] may be used in admixture with alcohols of faster evaporation rate to give good solvents.

Ethylcellulose is suitable for injection molding. Therefore it is available for applications requiring high-speed production. (Photo courtesy Dow Chemical Co.)

Ethocel films being slit by machine into convenient widths before going out to be used in electrical, packaging and other industries

Patents have issued on a large number of new compounds said to be useful as plasticizers for cellulose derivatives. They may be classified as follows: aromatic phosphates[5,26,27] aralkyl ethers of variously substituted phenols,[28] esters of the higher alcohols,[29] esters of polyhydric alcohols, such as glycerin,[30] glycol ether phthalates[31] and alkyl carbamates.[32]

The properties of ethyl cellulose films containing a variety of synthetic resins have been determined and the films have been examined for flexibility, sensitivity to dilute acids and alkalies and to ultraviolet light.[33]

Coating compositions

Developments in coating compositions have appeared in widely varying industries and are in keeping with the versatility of the cellulose ethers.[36-41] The alkali resistant properties of ethyl cellulose have been recognized in a process of lacquering the interior of caustic soda containers.[34] The thermal stability, low moisture absorption and good electrical properties have led to its adoption in a coating for automobile ignition cables.[35] Benzyl cellulose has been homogeneously dispersed with casein in a common solvent with the aid of sulfonated castor oil.[42] Continuing lively interest in moisture proofing lacquers for transparent foils and paper has been evidenced by the issue of a number of patents in this field during the year.[43-49]

Plastics

Molding plastics of ethyl cellulose have come into commercial use during the year.[5] They are said to mold easily by injection methods and to produce moldings characterized by good dimensional stability, low moisture absorption, and excellent low-temperature flexibility.[4] The dielectric behavior of typical ethyl cellulose injection molding plastics has been determined over a range of frequencies[50] and on immersion in water.[4] Complete data on the properties of ethyl cellulose injection molding plastics has been published.[4,5,51]

Films

Ethyl cellulose films remain the only cellulose ether films which are commercially available.[5] In a study of the dielectric properties of ethyl cellulose films,[4] it has been shown that the dielectric loss of unplasticized ethyl cellulose films is low compared to other wrapping films. It is remarkably unaffected by varied rigorous exposure conditions including immersion in water at 70° C. The durability of ethyl cellulose and other cellulose derivative sheets has been tested from the standpoint of their use in aircraft windows.[52] Plasticized ethyl cellulose films have been claimed as pressure sensitives adhesives in making laminated glass.[53] The backing paper for photographic roll films has been coated with a methyl cellulose of 49% ethoxy contents.[54] A process has been described for making a fabric by laminating with a cellulose derivative film, dusting on metal powder, and applying a clear lacquer top coat.[55]

Miscellaneous

Textile experts have described the use of melts of ethyl cellulose in mixtures of paraffin with stearic acid as embedding materials for the microtome sectioning of textile fibers. Formulas are recommended to match the toughness of the fiber to be sectioned.[56]

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Plastics Digest

This digest includes each month the more important articles (wherever published) which are of interest to those who make plastic materials or use them

General

NEW INDUSTRIAL USES FOR FARM CROPS. H. E. Barnard. Refrig. Eng. *36*, 155–8, 194 (1938). A greatly increased use of farm crops in industrial manufacture is predicted. Soybeans, sugars and starches may appear eventually in products ranging from plastics to motor fuel oil, thus affording the farmer a vastly enlarged market for his crops.

MATERIALS OF AIRCRAFT CONSTRUCTION. H. J. Gough. J. Roy. Aero. Soc. *42*, 922–1031 (Nov. 1938). The use of metals and alloys, wood, rubber and plastics in building aircraft is considered critically and completely in this exceptional survey constituting the annual Wright lecture of the British Royal Aeronautical Society.

TRANSPARENT PLASTICS FILL NEW ROLE IN DESIGN. J. Delmonte. Machine Design 26–30 (Dec. 1938). The more prominent innovations include the use of transparent plastics in building reproductions of small machines or working models of larger ones and for decorative effects in styling both machines and products.

Materials and Manufacture

SEPARATION OF HARD LAC RESIN. M. Venugopalan and H. K. Sen. J. Soc. Chem. Ind. *57*, 371 (Oct. 1938). Hard lac resin obtained by cold polymerization and fractional precipitation of shellac yields films having improved water-resistance, flexibility and adhesion, and a higher softening point. These properties are retained after two years storage.

PROPERTIES AND USES OF CHLORINATED RUBBER. J. P. Baxter and J. G. Moore. J. Soc. Chem. Ind. *57*, 327–39 (Oct. 1938). Data on viscosity, transparency of solution, tensile strength of films, thermal- and light-stability, compatibility with plasticizers, properties of plasticized mixtures and related properties are reported. Various uses of chlorinated rubber in paints, lacquers, molding powders, floor coverings, pipe jointing, and the like are described.

REVIEW OF AMERICAN PATENTS ON COLD MOLDING COMPOSITIONS. S. Pellerano and J. Delorme. Rev. Gén. Mat. Plastiques Suppl. *14*, 237–40 (Oct. 1938).

INFLUENCE OF FREE PHENOL ON YELLOWING OF PHENOLIC RESINS. P. Jacquinot. Rev. Gén. Mat. Plastiques *14*, 271–3 (Oct. 1938). Oxidation of phenol is responsible for the yellowing of phenol-formaldehyde resins. Three processes for the elimination of the free phenol, namely, solution, distillation and chemical combination, are discussed in detail.

LAMINATED SHEET FOR ELECTRICAL PURPOSES. E. E. Halls. Plastics *2*, 306–8 (Sept. 1938). Laminated material made with paper, fabric, or asbestos base is most readily evaluated by means of water-absorption tests provided electrical characteristics have been checked initially to ensure that standard specification values are being met.

Molding and Fabricating

TOOL STEEL FOR PLASTIC MOLDS. F. Rapatz. Kunststoffe *28*, 281–3 (Nov. 1938). The dependence of hardness, ease of polishing, corrosion resistance, heat conductivity and hobbing characteristics on the composition of the steel is demonstrated by experimental data.

REDUCING THE NUMBER OF BROKEN PINS. C. Pearson. British Plastics *10*, 323–4 (Nov. 1938). Recognized safety margins for ratios of length to diameter are 4 : 1 for vertical pins and 2 : 1 for horizontal pins. Accurate control of temperature and pressure and consideration of powder distribution or pellet hardness also minimizes bent or broken pins.

Applications

APPLICATION OF PLASTICS TO THE CABLE INDUSTRY. M. G. M. Hamilton. Trans. Inst. Plast. Ind. (London) *7*, 7–16 (July 1938). Rubber for insulating and sheathing cable has advantages of flexibility, elasticity, resistance to abrasion and to moderate temperatures, but it oxidizes and ages with time, is attacked by a variety of solvents and oils, is flammable, and is not as resistant to moisture as might be desired. Plasticized polyvinyl chloride possesses all the desired properties except heat resistance. The fact that it extrudes faster, requires no curing and does not demand the use of tinned conductors counterbalances the substantially higher price. Satisfactory sheathings can be produced from various elastic polymers for low voltage cables where rubber or some other suitable material is the dielectric. The requirements of high tension cable are more severe and only pure hydrocarbons appear to have suitable dielectric properties. Polyisobutylene, combined with a small amount of rubber, and polystyrene offer promise, but the latter when plasticized to give the requisite flexibility is subject to cold flow.

PLASTIC MATERIALS. C. R. Runk. Chem. and Met. Eng. *45*, 609 (Nov. 1938). The use of plastics in the construction of equipment for chemical plants is discussed with special reference to the asbestos-filled phenolic resin composition known as Haveg.

PLASTICS AND ELECTRICAL INSULATION. L. Hartshorn, N. J. L. Megson, and E. Rushton. J. Inst. Elec. Eng. *83*, 474–87 (Oct. 1938). An experimental study and discussion of the relation of constitution of plastics to their insulating qualities. Power loss is associated with the presence of polar groups (hydroxyls), partly by their vibration in the electric field and partly by their attraction for water.

USE OF RUBBER BASE PAINTS. G. N. Bick. Rubber Age *44*, 25–6 (Oct. 1938). The need for a coating material for use on concrete has led to the development of special chlorinated rubber paints.

LAMINATED PLASTICS FOR RADIO. T. J. McDonough. Electronics *11*, 8–11 (Oct. 1938).

SPECIFIC HEAT OF METHYL METHACRYLATE POLYMER. F. T. Gucker, Jr., and W. L. Ford. J. Am. Chem. Soc. *60*, 2563 (Oct. 1938). A value of 0.343 cal. deg.$^{-1}$g.$^{-1}$ was observed which makes the heat capacity per unit volume only 82% of that of glass. This factor in combination with a thermal conductance less than half that of glass, equal transparency, mechanical strength, and easy machining, makes this resin a useful insulating material in calorimetric work.

Testing

TESTING AND SPECIFICATION OF RESIN LAMINATED BOARDS FOR RADIO PURPOSES. J. A. Howie and F. H. Bayley. Brit. Plastics *10*, 270–6 (Oct. 1938). The results of water absorption, strength and electrical tests on laminates from 5 countries are reported. A new type of punching tool was developed to indicate the minimum safe distance between various types of holes, e.g., square, round, and diamond, with clearances between holes varied between $^1/_{32}$ to $^7/_{32}$ inch to cover the most commonly used thicknesses.

MEASUREMENT OF REFRACTIVE INDICES OF RESINS AND PLASTICS. C. D. West. Ind. and Eng. Chem., Analytical Ed. *10*, 627–8 (Nov. 15, 1938). Details of experimental technic are discussed.

TESTING OF SYNTHETIC RESINS WITH THE PLASTOMETER. R. Houwink and P. N. Heinze. Kunststoffe *28*, 283–7 (Nov. 1938). Data on the softening points and rates of curing of phenolic resins obtained with a Schopper Plastometer modified by Houwink are presented.

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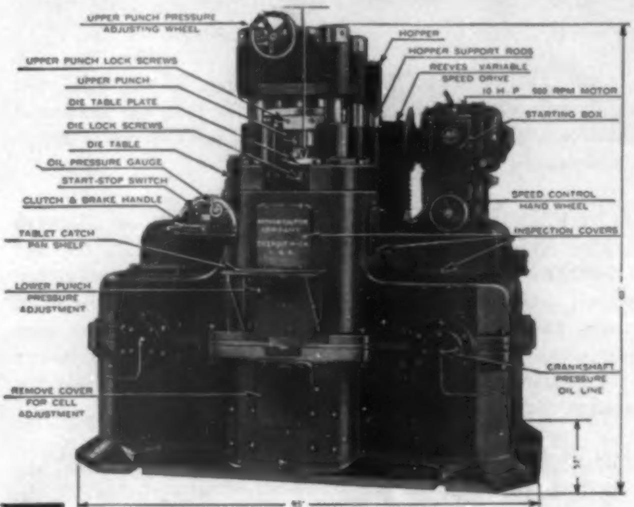

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U. S. Plastics Patents

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GASKET. F. L. Haushalter (to B. F. Goodrich Co.). U. S. 2,134,302, Oct. 25. An oil seal gasket for hydraulic shock absorber shafts is made of plasticized gamma polyvinyl chloride.

RUBBER-LIKE PRODUCT. H. G. Kittredge (to Kay & Ess Chemical Corp.). U. S. 2,134,335, Oct. 25. Modifying alkyd resins with a gel of heat-bodied vegetable oil to form products resembling rubber.

SAFETY GLASS. W. O. Herrmann (to Chemische Forschungsgesellschaft m. b. H.). U. S. 2,135,075, Nov. 1. Safety glass interlayers are made of a hydrophilic vinyl polymer and a polyhydric alcohol such as a sugar or dextrin, glycerol or the like.

POLYSTYRENE. O. H. Smith (to Carbide and Carbon Chemicals Corp.). U. S. 2,135,264, Nov. 1. Making tough, strong, flexible polystyrenes by adding at least 5% water to a 40% styrene solution, heating to accelerate admixture, and polymerizing by continued heating.

INSULATION. L. A. Meisse (to Ohio Brass Co.). U. S. 2,135,349, Nov. 1. Impregnating vulcanized fiber with phenol and formaldehyde and heating under pressure to effect the resin condensation reaction.

MASTIC TILE. Frank W. Corkery. U. S. 2,135,428 and 2,135,429, Nov. 1. Coumarone type resins and their sulphonates, plasticized with oxidized natural or synthetic pitch, for use in mastic tile.

TRANSFERS. H. L. Wampner (to Commercial Solvents Corp.). U. S. 2,135,446, Nov. 1. A surface to which a design is to be transferred is coated with a plasticized cellulose ester film which is imprintable under pressure but is not tacky.

PHOTOGRAPHIC FILM. G. F. Nadeau (to Eastman Kodak Co.). U. S. 2,135,524, Nov. 8. Between the cellulose ester backing and the emulsion layer of a flexible photographic film there are interposed a synthetic resin layer and a layer of oxidized cellulose acetate.

ABRASIVE SHAPES. N. P. Robie (to Carborundum Co.). U. S. 2,135,626, No. 8. Suspending abrasive grains in a polyvinyl ester solution in an alcohol, then effecting ester interchange between the alcohol and the polyvinyl ester to form a solid mass of polyvinyl alcohol containing the abrasive grains.

FILM MATERIALS. C. J. Malm (to Eastman Kodak Co.). U. S. 2,135,979, Nov. 8. Making cellulose acetate-propionate or acetate-butyrate by esterifying cellulose with acetate acid and anhydride containing a suitable proportion of propionic or butyric acid.

RUBBER PLASTIC. N. Bennett (to Imperial Chemical Industries, Ltd.). U. S. 2,136,270, Nov. 8. Reacting chlorinated rubber with an aryl halide and an open chain halide in presence of aluminum chloride.

SIZING PAPER. G. T. Lane and R. W. Peters (to Eastman Kodak Co.). U. S. 2,136,110, Nov. 8. A vinyl acetal resin, soluble in cold water, is used in sizing paper.

CURING RESINS. M. M. Safford (to General Electric Co.). U. S. 2,136,253, Nov. 8. Curing alkyd resins by masticating, while hot, till the resin sets in the solid, infusible state.

FRICTION FACINGS. C. Bockius, C. S. Batchelor and J. A. Cook (to Raybestos-Manhattan, Inc.). U. S. 2,136,370, Nov. 15. Making brake linings and the like in inlaid layers of a heat hardenable resin with fibrous filler, and powdered metal comprising a soft low melting and a ductile higher melting metal.

DENTURE. Norton L. Wheeler. U. S. 2,136,404, Nov. 15. Polystyrene or an acrylate or methacrylate polymer is used in dentures, because these resins can be vaporized within the mold below 825°F. without leaving any detrimental residue.

POLYMERIZATION. R. T. Fields; C. M. and R. T. Fields; C. M. Fields (to E. I. du Pont de Nemours and Co.). U. S. 2,136,422-3-4-5, Nov. 15. Forming rods and other elongated shapes from a liquid monomer by polymerizing in an untapered open end metal mold, filled with successive portions of the liquid having progressively decreasing catalyst content or progressively decreasing viscosity.

SAFETY GLASS. J. W. Haught (to E. I. du Pont de Nemours and Co.). U. S. 2,136,436, Nov. 15. A plasticizer for nitrocellulose interlayers in safety glass comprises 17–83% octadecanediol diacetate and 83–17% diamyl phthalate.

METHACRYLATE PLASTIC. B. M. Marks (to E. I. du Pont de Nemours and Co.). U. S. 2,136,450, Nov. 15. Pigmenting methyl methacrylate resin with not over 2% paraffin wax.

COATINGS. W. E. Gloor (to Hercules Powder Co.). U. S. 2,136,499, Nov. 15. Use of the acetate-butyrates of tri- and tetraethyleneglycol as plasticizers for cellulose derivatives or for chlorinated rubber in coating compositions.

POLYMERIZING ROSIN. A. L. Rummelsburg (to Hercules Powder Co.). U. S. 2,136,525, Nov. 15. Rosin, dissolved in a liquid organic halide, is polymerized with the aid of strong sulphuric acid.

TRANSPARENT FOIL. E. Gebauer-Fuelnegg, E. W. Moffett and E. M. Kratz (to Marbon Corp.). U. S. 2,136,544, Nov. 15. Laminated foil comprising a flexible casein sheet enveloped in a thin rubber hydrochloride coating.

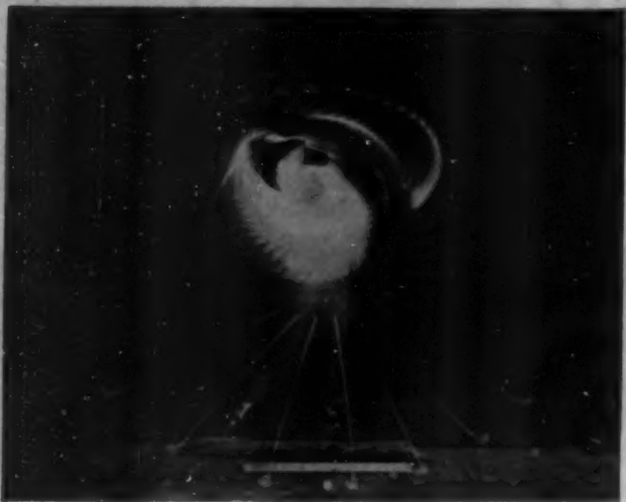
PLASTICIZERS. W. Schrauth; W. Schrauth and K. Stickdorn (to Deutsche Hydrierwerke Aktiengesellschaft). U. S. 2,137,006 and 2,137,007, Nov. 15. Plasticizing protein plastics with cyclohexanone glycerol; and plasticizing cellulose derivatives with the formates, acetates, butyrates, lactates, laurates, abietates, naphthenates, benzoates, succinates, adipates, citrates, phthalates, sulphates or borates of the unsaturated polyhydric alcohols derived from castor, linseed or grapeseed oil or from squalene.

LIGNIN PLASTIC. E. C. Sherrard, E. Beglinger, J. P. Hohf and E. Bateman (to Henry A. Wallace, Secretary of Agriculture of the U. S. A.). U. S. 2,137,119, Nov. 15. Making a thermoplastic by chlorinating air-dry vegetable fibrous material, heating to incipient dry distillation and treating with aniline.

COATED FIBERS. H. Burmeister (to General Electric Co.). U. S. 2,137,155, Nov. 15. Impregnating and coating moist fibrous material with a heat-hardenable synthetic resin, drying without causing the resin to melt, raising the temperature to melt the resin, then hardening it under heat and pressure.

STARCH FOILS. Harold A. Levey. U. S. 2,137,168-9-70-1, Nov. 15. A starch foil with inner adhesive face and outer waterproofed face, for protective coverings on books; a similar foil for medicinal bandages; spangles formed from a hard, brittle starch foil; and a starch foil which, without any added plasticizer, is flexible enough for use as a wrapping material.

NEWS



ULTRA HIGH SPEED PHOTOGRAPHY DEVELOPED BY DR. Harold E. Edgerton of M.I.T. and successfully used in cooperation with Arthur D. Little, Inc., in working out industrial problems, is being used by the new research department of A. G. Spalding to study flexes and stresses exacted upon golf clubs and other sports equipment in actual use. With this new photography, multiple 1/100,000 second exposures stop time and freeze it into small segments of timed motion for future study. The photograph used here as an illustration shows just what happens to Bobby Jones and his club when he swings on a ball. It was taken at the rate of 100 exposures per second. This same research technique has been successfully applied in the automobile, electrical goods and chemical industries.

THE TENNESSEE EASTMAN CORPORATION, KINGSPORT, Tenn., has recently announced a new thermoplastic molding compound known as Tenite II in conjunction with the issuance of a new price list for all Tenite materials. The new plastic, a cellulose acetate butyrate compound, is said to have particular resistance to distortion under varying degrees of heat and humidity. Articles made from one grade of the new material are reported as being able to withstand as much as five minutes' boiling in water without impairment of their surface finish. The material is available in a range of grades and colors for use in either compression or injection molding. In the latter process heated molds may be used for better weld and flow, a departure from usual injection molding technique.

VUE-PAK, A TRANSPARENT CELLULOSE ACETATE SHEETING, is the newest addition to the Monsanto Plastics group, according to an announcement recently by John C. Brooks, vice president of Monsanto Chemical Company in charge of the plastics division, Indian Orchard, Mass. New equipment, now in production, has been erected to produce Vue-Pak in all practical sizes and gages.

The special machinery developed for the new process is designed to produce transparent sheeting with a maximum gage variance of one-half of one-thousandth of an inch—which represents a major improvement over the previous cut cellulose acetate sheets.

GUSTAV JENSEN, INDUSTRIAL DESIGNER, IS NOW LOCATED in his new studios at 16 East 48th Street, New York City. His new telephone number is Plaza 8-2826.

WILLIAM O'NEIL, INDUSTRIAL DESIGNER, HAS PURCHASED complete interest in the partnership of O'Neil & Babbitt which has been dissolved by mutual agreement. He will continue to do business at 271 Madison Avenue, New York, N. Y., under the name of William O'Neil.

THE FIRST STEP IN AN EXPANSION PROGRAM FOR THE MANUfacture of ethyl cellulose was announced recently by officials of Hercules Powder Company. Work will begin at once on the construction of a new ethyl cellulose plant at Hopewell, Virginia. At the present time, Hercules ethyl cellulose is manufactured in a plant at the Hercules Experiment Station, near Wilmington, Delaware. Transfer of all manufacturing activities to Hopewell will be made as soon as the new plant is completed. The new unit provides Hercules with increased production facilities to keep pace with the growing demand.

W. H. MILTON, JR., ASSUMED ON DECEMBER 1 THE DUTIES OF manager of sales for the plastics department of the General Electric Company, Pittsfield, Mass. He succeeds K. W. Nelson, recently deceased. Born in Roanoke, Va., in 1900, Milton was graduated from the Virginia Military Institute in 1920 and entered test with General Electric soon afterward. Following test and engineering experience in the company's Schenectady and Pittsfield works, in 1925 he was transferred to sales duty in the Philadelphia office, where he remained until the present promotion.

THE CELLULOID CORPORATION, 10 EAST FORTIETH STREET, New York, N. Y., announces the establishment of a new department to be known as the "Molding Powder Division." William T. Cruse has been appointed director of sales of this new division. This gives the Company seven sales divisions through which its products are offered to the trade.

ONE OF OUR BRITISH CONTEMPORARIES APPEARS QUITE excited about a new German process for injection molding of thermosetting materials announced in its November issue. Of course we may be mistaken, but this looks not at all unlike the process known as transfer molding and used in this country for a number of years. It was quite fully described in our February number in 1935.

AN EDUCATIONAL EXHIBIT CHART ON SYNTHETIC PHENOLIC resin manufacture has recently been prepared for schools and colleges by the development division of General Plastics, Inc., North Tonawanda, N. Y., manufacturers of synthetic resins and molding compounds. This exhibit pictorially illustrates the source and manufacture of phenolic resins. It contains samples showing the various stages of production and finished examples of ultimate uses of resins in such products as laminated paper, brake lining, molded plastic pieces, etc. A concise story of the manufacturing process as well as a list of current books on the subject is given in an accompanying folder. A nominal charge is made for these charts.

AMERCOAT SALES AGENCY, 5905 PACIFIC BOULEVARD, Huntington Park, California, exclusive distributors of Amercoat cold-applied, synthetic organic plastic corrosion-resistant coatings, manufactured by American Concrete and Steel Pipe Company of South Gate, California, announce the appointment of Robt. E. Lanier and Com-

pany, Electric Building, Houston, Texas, as exclusive distributors of the products for the States of Texas, Oklahoma, Arkansas, Louisiana and Mississippi. Other warehouse stocks are located in Swampscott, Massachusetts, headquarters of the Hume Pipe of New England, Incorporated, who distribute Amercoat through the New England states and the state of New York, and in northern New Jersey; and in Philadelphia, from which The Gregg Company, 1418 Walnut Street, distributes the products in southern New Jersey, eastern Pennsylvania, Maryland, Virginia and Delaware; and in San Francisco, where they are distributed by Thomas A. Short Company, 575 Howard Street.

THE RÖHM & HAAS COMPANY, INC., OF PHILADELPHIA, announces a competition sponsored by the Museum of Modern Art for the best example of sculpture worked in the medium of Plexiglas, a new plastic of great beauty and more transparent than glass. Gilbert Rohde, consultant designer for Röhm & Haas, who conceived the competition, will act in conjunction with the Museum in directing the competition and act as technical adviser to the judges.

Since it is not feasible to supply each of the entrants with sufficient Plexiglas to complete a piece of sculpture, submissions are to be in sketch form. The Jury (to be announced later), selected by the Museum of Modern Art, will choose five sketches from the submissions. Each of the competing artists will be supplied with sufficient Plexiglas in the forms needed to complete his sculpture. The judges will allocate the various prizes among those who complete a sculpture upon the basis of the finished work. The prizes are as follows:

First prize	$800
Second prize	$300
Third prize	$200
Fourth prize	$100
Fifth prize	$100

The sculpture winning first prize will remain the property of Röhm & Haas and will be shown at the New York World's Fair 1939. Other prize-winning pieces of sculpture will be the property of the sculptors but will remain in the possession of Röhm & Haas for one year after the opening of the New York World's Fair. After the closing of the Fair, the Museum of Modern Art reserves the right to exhibit the winners.

The dates for submission are as follows:

Mailing of sketches	February 10, 1939.
Selection of five winners	February 20, 1939.
Completed sculptures	April 1, 1939.

Artists wishing to participate in the contest are requested to write to Mr. Gilbert Rohde, 32 East 57 Street, New York City, for an entry blank and set of rules. Samples of Plexiglas will be supplied, with complete information on the properties of the material.

THE JEWEL PICTURE HANGERS, SHOWN IN OUR DECEMBER "In Review" section and erroneously described as being cut from long strips of cellulose acetate, are completely injection molded. They are made by the Emeloid Co., Arlington, N. J.

DETAILS OF THE SECOND ANNUAL MACHINE AND TOOL Progress Exhibition—to be held in Detroit, March 14th to 18th, were announced recently by Frank A. Shuler, Chrysler Corporation, Chairman of the Show Committee.

ZENITH METAL PRODUCTS CO., INC., ANNOUNCES THAT Russell F. Mathews has been appointed representative of their Plastics Division in the western part of Ohio and Michigan, with offices at 7310 Woodward Avenue, Detroit, Michigan.

THE INCELOID CO., INC., NEW ORLEANS, LOUISIANA, HAS issued a compact sample book of transparent sheeting in clear and colors of various thicknesses. The material is claimed to be water-proof, grease-proof, oil-proof, air-proof, dust-proof, germ-proof and mold-proof, is non-inflammable and non-attractive to vermin and rodents. The material is usable either for packaging or displays and the sample books are available upon request.

DEVELOPMENT OF A WHOLLY NEW SYNTHETIC MATERIAL of numerous potential uses, one of which may be of revolutionary importance in fine hosiery, was announced recently by E. I. du Pont de Nemours & Company, Wilmington, Del. Christened "nylon," the new material is considered by the du Pont Company to be one of the most significant developments in the history of industrial research in the United States. Nylon textile yarn differs from rayon in that it does not contain cellulose and is not derived from cellulose.

The new synthetic material is the outgrowth of research that has covered the better part of a decade. Its objective was the synthesis from readily available native raw materials of a wholly new group of chemical compounds capable of meeting deficiencies in certain existing industrial materials that in the main are now imported.

This is the newest of the synthetic fibers. Though wholly fabricated from such common raw materials as coal, water and air, nylon can be fashioned into filaments as strong as steel, as fine as the spider's web, yet more elastic than any of the common natural fibers and possessing a beautiful luster. In its physical and chemical properties, it differs radically from all other synthetic fibers.

Nylon is the generic name for all materials defined scientifically as synthetic fiber-forming polymeric amides having a protein-like chemical structure, derivable from coal, air, and water, or other substances, and characterized by extreme toughness and strength and the peculiar ability to be formed into fibers and into various shapes, such as bristles and sheets.

Like natural silk, nylon is a polyamide having a protein-like structure. Filaments of extreme fineness can be spun—much finer than the filaments of silk and rayon. The dyeing of nylon presents no particular difficulty. In general it will take dyes used for silk, wool, acetate, and certain of the direct dyes used for cotton or rayon.

Of particular promise among the prospective uses for nylon is high twist yarn for fine hosiery. Hosiery made of nylon possesses extreme sheerness, high elasticity and high strength. "Exton" bristles made from nylon are already being fabricated for toothbrushes, and other forms of this new product will reach the public as a result of experimental work now in progress.

A sum of more than $8,000,000 has been appropriated by the du Pont Company to construct in lower Delaware the first unit of a plant to produce nylon textile fiber for use in the knitting industry, particularly for hosiery, for use in sewing thread and for use in woven fabrics. When completed, this initial plant unit will give employment to approximately 1,000 people. This illustrates how science is answering the accusation that inventions take jobs away.

For several months a pilot plant has been operating near Wilmington to produce small commercial quantities of nylon yarn and "Exton." As the output of the pilot plant is limited, nylon, will not be widely available until the Delaware plant is operating.

THE TAYLOR-ATKINS PAPER MILLS, INC., WINDSOR, CONN., associated with The Stevens Paper Mills, Inc., of the same address, announces a new type of phenolic resin-impregnated paper suitable for general laminating and forming operations. The material, manufactured during the paper-making process through use of a new and novel method of saturation, has been in production for the past several months, following a year's extensive program of research and development work.

AT A DIRECTOR'S MEETING OF THE SOCIETY OF THE PLASTICS Industry, held in Cleveland, Ohio, on November 19, 1938, machinery was set up for gathering statistics to be distributed to contributing members through a neutral agency yet to be named. It was proposed by the directors that individual membership dues be established at $5.00 per person, and it was recommended that at least a part of the present administration be asked to remain in office during the new year to give incoming officers the benefit of knowledge gained during their term.

MAKING AN IMPORTANT CONTRIBUTION TO THE WAVE OF industrialization along the line of the Seaboard Railway, the American Cyanamid & Chemical Corporation, 30 Rockefeller Plaza, New York, N. Y., has purchased land and buildings for the establishment of a chemical works at Georgetown, S. C., it was announced today by Warren T. White, Seaboard general industrial agent.

Publications

Write for these booklets. Unless otherwise specified, they will be mailed without charge to executives who request them on business stationery. Other books will be sent postpaid at the publisher's advertised prices.

Plastics—Problems and Processes

by Dale E. Mansperger, M.A.
and Carson W. Pepper, M.A.

Published by International Textbook Company, Scranton, Penna.
Price $2.50 — 187 pages

This book deals completely with the fabrication of cast plastics. Beginning with a brief story of the materials, their meaning, their history and the various kinds of plastic materials, the text follows naturally and easily through the subjects of tools, equipment and supplies, forming and shaping operations, finishing and assembly with detail sketches to clarify every operation.

Actual designing and fabricating problems are stated, then methods of working them out are explained and illustrated in sufficient detail to enable anybody to make any one of the hundreds of items which are pictured in their completed condition. Many of the examples used to illustrate this work have been worked out in the class rooms of the authors. Mr. Mansperger heads the Arts and Industries Laboratory, Central High School, Euclid, Ohio; Mr. Pepper directs the Plastics Division of the Industrial Arts Department in the W. H. Kirk Junior High School, East Cleveland, Ohio.

With the supplementary information on various plastics, the glossary and directory of supply sources, this book becomes an important guide and reference volume for all schools attempting to fabricate plastics as well as for those whose hobby consists of making things at home.

E. F. L.

The New Vision

by L. Moholy-Nagy

Published by W. W. Norton & Co., New York, N. Y.
Price $3.75 — 207 pages

Mr. Maholy-Nagy as director of The New Bauhaus, American School of Design, Chicago, Ill., sets out to inform laymen and artists about the basic elements of Bauhaus education, where theory and practice in design are merged in a program of invention and creation. The basic idea of this education is "that everyone is talented, that once the elementary course has brought his emotional and intellectual power into activity, he will be able to do creative, which means his own, work."

The book is a revised edition of one previously printed in Germany, with a new foreword and examples of the work done in Chicago during the first year of the New Bauhaus. There are, of course, many examples of the work formerly done by students in the original school. To the industrialist, the illustrations will be amazing: the descriptions, even more amazing. It nevertheless reveals a trend which brands it an important work. Freedom of creative and cultural expression will release man from much of the monotony he has endured in the past. E. F. L.

THE PARKER-KALON CORPORATION, 200 VARICK STREET, NEW York, N. Y., has issued a 68-page booklet describing its line of fastening devices. These self-tapping screws, bolts and nails are available in types for use with plastics, metal, masonry and wood. When used in conjunction with molded parts, they are reported to effect substantial savings in assembly costs through elimination of tapping operations.

HEAT IS A COSTLY AND NECESSARY ADJUNCT TO MOST MOLDing operations. To waste heat makes such operations even more costly than necessary. To prevent loss of heat, The Eagle-Picher Company, Temple Bar Building, Cincinnati, Ohio, provides insulating mineral wool for pipe insulation. Absolutely fireproof, the material is available in various sizes and lengths for pipe application, or it may be obtained in pellet form to be used with a binder and applied on unusual or difficult forms in a plastic state. A booklet, recently issued, describes various forms of the material and illustrates its application in industry.

Modern Publicity

by F. A. Mercer and W. Gaunt

Published by the Studio Publications, Inc., London and New York
Price $3.50 paper bound, $4.50 cloth bound — 144 pages

From packages to posters, from Chicago to Czechoslovakia, the art and science of publicity in all its phases is reviewed in this "Annual of Art and Industry." From each country, the outstanding accomplishments in design, layout, copy and arrangement of advertising vehicles are chosen and reproduced. Examples of particularly good adaptations of art to advertising and publicity are illustrated. Trends in various nations and the influence of the decorative arts on advertising are discussed. In every sense the book is an international parade of the best in modern publicity.

THE FLEXIBLE METAL HOSE & TUBING INSTITUTE, 150 BROADway, New York, N. Y., announces publication of a new booklet entitled "The Fact Book of Flexible Metal Hose and Tubing" which, for the first time, presents a complete factual story of these important products while graphically portraying their almost unlimited usefulness in meeting many of industry's most difficult design, construction and maintenance problems.

THE 1938 EDITION OF THE CHEMICAL ENGINEERING CATAlog has been published by the Reinhold Publishing Corp., 330 W. 42nd Street, New York, N. Y. Included in the 1034 pages of this massive volume are a trade name index, and sections on equipment and supplies, chemicals and raw materials and technical and scientific books including sources, specifications and descriptions.

THE PLASKON COMPANY, TOLEDO, OHIO, HAS PUBLISHED A booklet which summarizes the history and progress of this company's product. Bound in a blue paper cover and entitled "Molded Color," the presentation is illustrated with pictures of the more outstanding applications of some of the fields into which Plaskon has entered. The illustrations serve to show the constantly increasing number of uses to which this material may be put, and the part it has played in the remodeling of many industrial and domestic articles.

THE USES OF FORMICA LAMINATE AS WALL COVERINGS, table tops, base boards and kick plates are described in a new booklet issued by the Formica Insulation Co., Cincinnati, Ohio. The colors and surface designs in which the material is available are shown in full color and methods of installation described.

THE 1939 ISSUE OF THE A.S.M.E. MECHANICAL CATALOG AND Directory has been published by the American Society of Mechanical Engineers, 29 W. 39th Street, New York, N. Y. In addition to the catalogs of manufacturers who include descriptions and specifications of their products, there is included a directory of thousands of items used in industry, an alphabetical list of trade names and a list of A.S.M.E. publications. It is priced at $3.00.

THE NEW 150-PAGE HANDBOOK ON CONTOUR SAWING, issued by Continental Machine Specialties, Inc., 1301 Washington Avenue South, Minneapolis, Minn., is now available.

ARMSTRONG-BLUM, CHICAGO, ILL., HAVE ISSUED A BOOKLET illustrating its Marvel High Speed Automatic Hack Saws for tool rooms where bar and rod steel must be sawed with accuracy and economy. Nests of small bars may be fed up and cut to uniform lengths automatically because they are clamped on a positive hold-down device which travels with the bars.

A RECENT ANNOUNCEMENT OF THE ATLAS PRESS COMPANY, Kalamazoo, Mich., gives first details of the company's lathes for 1939, including a 10-inch model equipped with power cross feed mechanism.

THE UNITED STATES HOFFMAN MACHINERY CORPORATION, 105 Fourth Avenue, New York City, has published an eight page booklet dealing with the company's line of industrial vacuum cleaners. The hazards of dust accumulations in manufacturing plants are set forth and the various types of equipment available for meeting the problem are described.

CLASSIFIED

WANTED IMMEDIATELY: Large Molding Presses, Multiple Ram Presses, Injection Presses, Hydraulic Pumps, Hydro-Pneumatic Accumulators, Preform Machines, Pebble Mills, Mixers, Sifters, etc. WILL PAY CASH. We carry large stocks of Plastics and Hydraulic Equipment. Send us your inquiries. Reply Box 220, Modern Plastics.

"Wanted for immediate and future deliveries Plastics raw-materials surplus, nitrate and acetate waste, casein scrap, fillers, chemicals, colors. Send details concerning price and quantity. Reply Box 245, Modern Plastics.

Sales representative wanted by large eastern molder on commission basis for the Chicago Territory. One with engineering and some plastic experience desired. Reply Box 255, Modern Plastics.

Branding, printing machine for Roll Leaf on Plastics. Used, excellent condition. Complete ready to operate. Reasonable. Reply Box 256, Modern Plastics.

For Sale—#3 Keller Mechanical Die Sinking Duplicator—#616-33-E3—Complete with motors, switches, wts., etc. Photo and full description on request. Reply Box 257, Modern Plastics.

Specialist of British nationality, well-known author with many years experience in the manufacture of various plastics, hot and cold moldings by compression, injection and extrusion processes, offers collaboration for general management or in advisory capacity to American or Canadian firm. Valuable patented inventions available. Reply Box 258, Modern Plastics.

Equipment

VICKERS, INC., HAS ANNOUNCED A NEW DOUBLE PUMP AND combination valve unit which is reported as being able to vary its output to take care of either large or small volume requirements for hydraulic pressure, while still maintaining the design of constant volume pumps. The units are available in a range of sizes and are said to be incorporated in some of the new injection and self-contained compression presses.

A NEW LOW-PRICED ELECTRIC ETCHER MARKS IRON AND steel and their alloys, including hardened steels, legibly, permanently, easily and economically. It is another development of the Ideal Commutator Dresser Co. This etcher is used in the same manner as a pencil and engraves names, sizes, models, numbers or other important data on smooth surfaced parts, tools, dies, saws, plates, gears, etc.

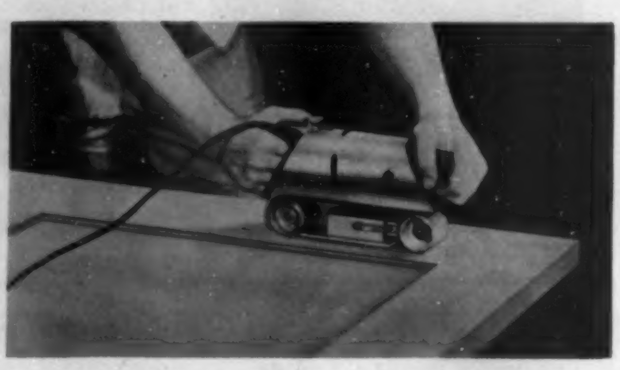
"SEMS" IS THE DESIGNATION OF A NEW FASTENING UNIT, the latest addition to the Shakeproof line of metal fastenings. The new unit is said to speed up production by saving time formerly lost in putting lock washers on screws. Since this device has the washer as an integral part, no screw can be driven without a lock washer under the head to protect it from vibration.

A NEW LINE OF LIGHTING UNITS DESIGNED TO UTILIZE unique lighting characteristics of recently introduced daylight-white fluorescent lamps has been placed on the market by the Benjamin Electric Mfg. Co. Known as "Daylight" fluorescent lamp diffusers, these new units are reported to have numerous industrial and commercial applications, and are available in 36-inch and 18-inch sizes. Each unit is arranged for three lamps and the practical absence of radiant heat permits location low over the working plane. Among the many uses of the lighting units is quality- and color-inspection of plastic materials.

A FIREPROOF BLANKET, SO MOUNTED THAT IT CAN BE wrapped tightly around one's body in a few seconds without assistance, is being marketed by the Davis Emergency Equipment Company, in response to an increasing demand for this type of protection for laboratory and industrial workers. Normally, the Davis Fire Blanket is wound on a vertical roller, which is mounted on a wall or post. Should a worker's clothes catch fire, or should it be necessary for him to dash through flames to reach safety, he thrusts an arm through a catch-rope attached to the exposed edge of the blanket and, turning rapidly, wraps the blanket closely around him, thus extinguishing flames in his clothing or protecting himself from burns.

EVERY INDUSTRY HAS ITS OWN PROBLEMS TO SOLVE IN preventing accidents. Due to the multiplicity of operations, hundreds of different hazards are encountered which make necessary a large variety of accident prevention equipment to protect workmen.

To aid in solving industry's protective problem, the American Optical Company, with more than a hundred years of experience in conserving and protecting eyesight, now announces a new and complete line of highest quality protective clothing, gloves, sleevelets, leggings, aprons, hats and hoods. These products are available in a variety of materials used to protect workmen from heat, fire, acids, cuts, abrasions, etc. The materials used and the finished products are designed to give maximum comfort and protection under specific conditions. The company also announces that special items of protection can be made to order to meet unusual requirements.



BRINGING NEW SPEED, EFFICIENCY AND CONVENIENCE TO metal and wood workers a nine-pound, portable electric belt sander has just been announced by the Syracuse Guild Tool Company of Syracuse, N. Y. Featured for its handy compactness and moderate price, this new power tool was especially designed to make available to the average workman the advantages of the belt-type sander, and to eliminate the costly drudgery of hand sanding, surfacing and refinishing.

Light in weight, the Guild Sander is usable in any position. It is said to have the power to do all types of sanding and the adaptability to sand all straight or slightly curved surfaces. The front pulley may even be used as a spindle sander. Where paints, varnishes and other surfacing materials have to be removed, it is a valuable time- and labor-saver eliminating entirely the use of scrapers, chemicals or torches. In addition to its wide utility on wood and metals, it may be used on slate, plastics and composition materials.

CHIKSAN OIL TOOL COMPANY, LTD., HAS ANNOUNCED A line of $^3/_8$ in. and $^1/_2$ in. ball bearing swing joints. These joints are steel with full openings for their respective sizes, and are designed for use in machine shops, die casting, rubber and plastic molds and for any application that requires a small flexible joint. Their construction is the same as that found in the larger sizes—($^3/_4$ in. to 12 in.) which Chiksan has manufactured for the past 8 years. They are reported to give complete 360° rotation without binding, rotating freely on double rows of hardened steel ball bearings. They have nothing to tighten or get out of adjustment, whether used with gas, fluid or steam. The grease is sealed off from contact with the contents of the line and under ordinary service these joints do not require greasing after installation. Low pressure models are tested to 300 lbs., while high pressure models are tested to 4000 lbs. with an ample safety factor allowed.

1

1. Pioneer belts now come in these lustrous molded packages, cigarette boxes when the belts are removed. The boxes are molded of Resinox by Arthur Hyde

2

2. Styled by Olson Designers and molded by Auburn Button Works, the new Wahl-Eversharp allows full view of the pen and pencil set, yet protects it from breakage, dust and dirt. A cellulose film fits over the Bakelite urea molding, available in several different bright colors

3

3. This "Cutty Sark" won't ever sail the seas, but it does reproduce the old sailing master in Lumarith. Fred Harris used this material for the entire model ship

4

4. The interior structure and working parts were clearly demonstrated on this French automobile by use of Plexiglas sections to replace the usual metal. It attracted a great deal of attention at the French motor show

5

5. A Durez handle, molded to fit the hand, and fitted with a Tel-A-Lite warning signal, features the new Knapp-Monarch electric iron.

6

6. The Canpour, fitted with a metal spear to pierce metal cans, forms a sanitary, leakproof and dripless pouring spout for evaporated milk and other liquids. It's molded of Bakelite urea material

IN REVIEW

7

7. A Lucite lens fits into a Tenite lens frame in this welding eyeshield made by Reynolds molded plastics for H. A. Jackson. Fitted with an adjustable head-band, protection against glare and sparks is provided, but the assembly is light in weight and durable.

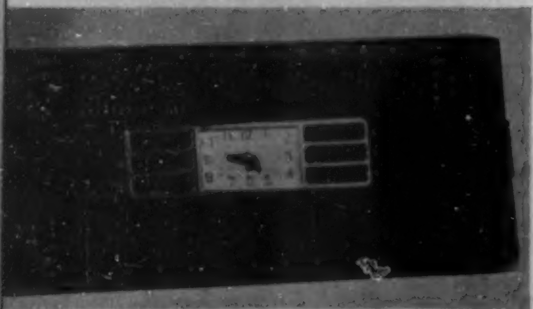
8

8. The Maniqueen electrical set, for motorized manicuring, uses a molded Durez housing. Spare buffing and polishing heads are kept in a compartment with a hinged lid of the same material. All molded parts are by Atlantic Plastic and Metal Company

Send a 3-cent stamp to the Editor for manufacturers' addresses.

9

10



11

9. Incorporating everything that makes the modern stove timer a marvel of efficiency, General Electric houses its latest model in gray Plaskon, designed in smart pleasing lines

10. Transparent, yet sturdy enough for household use, is this Plexiglas bed tray, made by Dave Swedlow. Table-top, rail and legs were cut from this material, then assembled in a modern, unusual design

11. Slots, ribs, holes and depressions are molded right into this preselector escutcheon assembly on one of the latest General Electric radios, with tolerances held close and good design and appearance preserved

12. New rifle and pistol rod cleaners of Tri-Pak Gun Kit, Inc., use Durez handles molded by the Remler Co., mounted on special radial and thrust ball bearing swivels. The use of this material in conjunction with duraluminum rods insures long wear and light weight

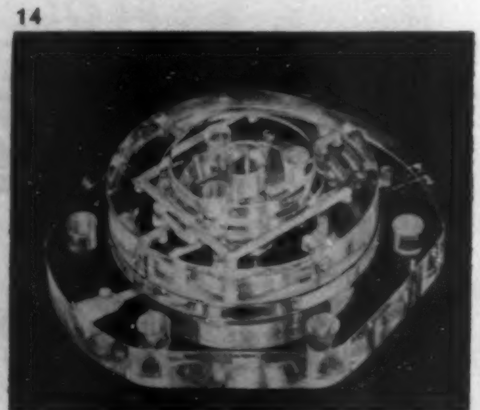
13. The World's Fair theme is the subject of this 20-inch "Cloisonnette" plaque, made of Plastecele by the Gemloid Corp. A three-dimensional effect, giving the illusion of reality, is obtained with a patented embossed lithograph process

14. Stricker-Brunhuber fashioned this model of a Cummins Diesel fuel injection part from Lucite. With the fuel tubes cut right through the material and colored bright red, the principle of the device is clearly shown

12

13

14



15

IN REVIEW

15. There's still a place for the dip pen, especially when it combines up-to-date styling and modern materials as effectively as the Parkomatic does. Trace and Warner designed it; Barber-Colman molded it of Bakelite for the Parker Pen Company

16. The Nu-Vita Beauty Sterilizer combines a sterilizer, a case for barbering and hair-dressing instruments and compartments for other accessories in one neat, sanitary appliance. Durez, molded by Northern Industrial Chemical Co., is used for the case

Send a 3-cent stamp to the Editor for manufacturers' addresses.

16

CLEOPATRA GOES TO TOWN

(*Continued from page 31*) ing to a Procter & Gamble program, broadcasting an announcement of the new bath brush. You might have found it interesting. But no matter, they will be broadcasting similar announcements during the week and you can listen in if you want to."

While he was talking, Mr. Bressler rummaged about in the drawers of his desk and in a tall cabinet at the other end of the room, dragging out one brush after another which he lined up on the desk in front of us.

"These," he explained, "represent the various stages in the evolution of the new bath brush."

There were nine in all: some were slotted from side to side in the center of the brush back for a detachable handle; others with the slot running lengthwise of the brush; some with detachable handles of hard rubber; others with detachable cast resin handles; some with handle and brush back in one piece of cast resin. There were many different color combinations and designs.

Made entirely of Catalin in several colors, this 5-foot display figure of Cleopatra attracted attention to the Ox Fibre Brush Company's display at the Premium Show. This too was designed by Lurelle Guild

"This was our first attempt," said Mr. Bressler, picking up the brush at the head of the line. One that was slotted sideways, with hard rubber handle. "It didn't work out to our satisfaction because the brush part seemed to go the wrong way.

"We thought we had the answer when this one came along," he continued, choosing another from the array. This was slotted lengthwise with the same type of handle. "Our customer thought so, too, when I showed it to him. An order all ready to be signed was on the desk between us. I was uncapping my fountain pen ready to hand it over when I heard a sharp, cracking sound. I looked up quickly—then recapped the pen and put it back in my pocket. The customer had slipped the handle from the slot to examine it more closely, and while he waited for the pen, tilted back in his chair and stretched a bit raising the handle in his two hands over his head. Now he had two separate pieces, one in each hand. The material we had picked for the handle was brittle and not flexible enough for the job. The order? Well, that landed in the waste basket."

The next brush was given a cast resin handle, also detachable, but tests developed complaints that the pieces came apart too easily to make it really practical. From that point on, the brushes were made in one piece of cast resin, up to the ninth.

"The ninth brush was all right functionally," Mr. Bressler told us," but it didn't have the old E. A. (eye appeal). So we called in Lurelle Guild, well-known industrial designer and decorator, and the tenth brush, the one made for Procter & Gamble, is his design." From a carton that had been resting on one corner of the desk, he drew a brush—the tenth. Everything about it hinted of quality and good taste—the pale Nile green color; the delicately molded Egyptian head decoration; the firm white bristles; the smooth beveled edges; the long curved handle; the lustrous sheen of the plastic material itself.

"Perhaps you would like to get Mr. Guild's slant on the design," suggested Mr. Bressler.

We would, but stopped long enough on the way out to examine and admire a life-size Egyptian figure (Cleopatra they call it) propped rakishly against the wall. It, too, was designed by Mr. Guild and made of sheets of cast resin in appropriate colors. Its only mission in life up to then had been to preside over the booth of the Ox Fibre Brush Company at the Premium Show.

One has to get up early in the morning, we discovered, to manage a few uninterrupted minutes with Mr. Guild—he's that busy. Anyhow, the clock hadn't struck nine the morning we settled down in his office for a chat.

Design for premium merchandise, we soon learned, isn't pulled willy-nilly out of a hat. No, indeed. There are subjects to be evolved and considered, plans to be drawn, models to be made, colors to be chosen, intensive testing to be done. All helped along by an inherent knowledge and keen appreciation—on the part of the designer—of what people want.

"Merchandise for the premium market," Mr. Guild told us, "must be styled to appeal to the class of people

who will be likely to take advantage of it. A piece may be beautiful in construction and design, but if it is not styled for the market it is to serve, if it is too high-hat or too far ahead of its potential users' conception of desirables, it represents just so much wasted time, expense and effort.

"The classic Egyptian head was chosen for the brush back over several other possible decorations, because tests proved that it was more familiar and more generally liked by those it was intended to please."

Settling upon the design was one definite accomplishment; applying that design to the plastic material was something else again. It seems that the head has several undercuts and the process of fashioning cast phenolics does not take kindly to undercuts. "It can't be done," was the ultimatum. Now that is no way to talk to a designer who has created a design he believes is right, to decorate a material that he knows should be flexible enough to take it. So Mr. Guild turned inventor for a bit and, with the help of his associates, worked out a method by which it *could* be done (patent pending).

That is one of the nice things about plastics. They lend themselves to new methods to meet new demands. Funny thing is, these departures from common practice are usually initiated by designers or others outside the industry itself.

Choice of color for the bath brush was a sizable task all by itself. It had to be one that could move right into any bathroom and be in harmony with the color family already established—not a bold and conspicuous black sheep. Manufacturers of bathroom fittings were consulted and from them it was learned that a certain shade of green was the predominating color in modern bathrooms. Green, then, was the logical color for the brush. The lovely pale Nile green selected is a brand new color in plastics, developed especially for the brush and not only is it happy with other greens, but also with practically any bathroom color scheme.

With material, design, method and color taken care of, there still remained a last check-up before the bath brush was definitely in as an entirely acceptable premium. This final O.K. had to come from those who would use the brush. Crews of boys and girls, trained for the work, went from house to house in strategic localities, armed with several possible premiums, among them the bath brush. They asked for and secured the opinions of housewives who answered such questions as: "Which of these articles would you find most useful? Why do you prefer it? Do you like it well enough to pay the price and follow the instructions for receiving it? Do you like the color? The design? etc., etc. About the same time an announcement of the offer was made on spot broadcasts by Procter & Gamble, and it was only after the results of these efforts were tabulated and analyzed that the bath brush was picked as the winner. A premium that successfully hit the market for which it was especially intended and designed.

So . . . . . . "For only 50 cents and the front panels from 4 ivory soap wrappers (medium size) an exclusively designed bath brush . . . .

WICO AND PLASTICS

(***Continued from page 29***) around the coil caused corona losses between the coil and grounded housing. Also, the smallness of the terminal on the *LD* permitted a leakage of the secondary current. Wico again turned to plastics and with the help of the molder designed a part (Fig. 7) incorporating both the terminal and cover which overcame the difficulty. With the design of this part they also were able to change the coil jacket, leading of course, to more simple design.

It was on the model *A* that the plastic condenser housing (Fig. 9) was first used—an ingenious piece of engineering and designing, placed in the breaker compartment for the sake of room and compactness. It is true that as a condenser housing it was just another piece of molded insulation but Wico went a step further by designing this plastic housing also to act as a terminal post for joining the live end of the condenser with the primary coil lead and it was designed to anchor the stationary end of the breaker spring. This plastic part, thus designed, eliminated many insulating washers and bushings, providing greater simplicity and lower costs. Compare the appearance, compactness and simplicity of the interior of the model *A* breaker housing with that of the *LD* in Fig. 6. The condenser housing was also designed to act as a support for the wick for lubricating the cam which heretofore had not been lubricated except for a little grease applied during assembly. The new method assured permanent lubrication and again plastics contributed to progress in quality at lower costs.

Industrial magnetos must produce a spark under all atmospheric conditions and circumstances—dampness, humidity, dryness, dustiness and every other conceivable circumstance. Because of the extreme conditions under which a magneto must operate, failures do happen—therefore, the designer must make the product so it can be serviced. You would not think that this one small part (condenser housing) could offer so many advantages in design, operation and manufacture, but even stranger is the fact that it overcame a serious repair problem. By making the condenser of plastics, its size could be reduced so it could be removed through the breaker housing opening whereas on the *LD* it was necessary to remove the entire back cover of the magneto. Also, on the *LD* and older models, it is necessary to remove the end plate and core laminations in order to remove the coil. This disturbed the fit between the rotor member and armature, causing considerable trouble. On the *A* model it is only necessary to remove the plastic cover to take out the coil and no working parts are disturbed. Thus, simplicity and easy accessibility.

The Wico Electric Company's next ambition was to build a tractor and oil field engine magneto. They knew this magneto must be rugged, resist vibration and have the ability to withstand most extreme conditions of dust and moisture. With these specifications they developed the *AP* model magneto (Fig. 4).

About the same type of molded parts were used as on the *A* model but the wall thickness was increased. It

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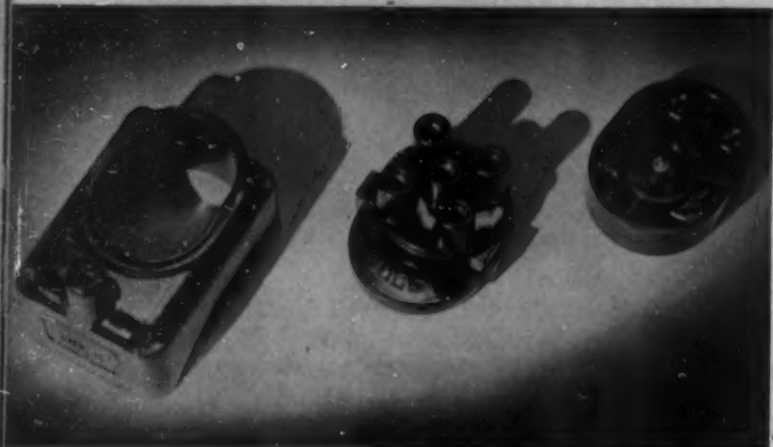

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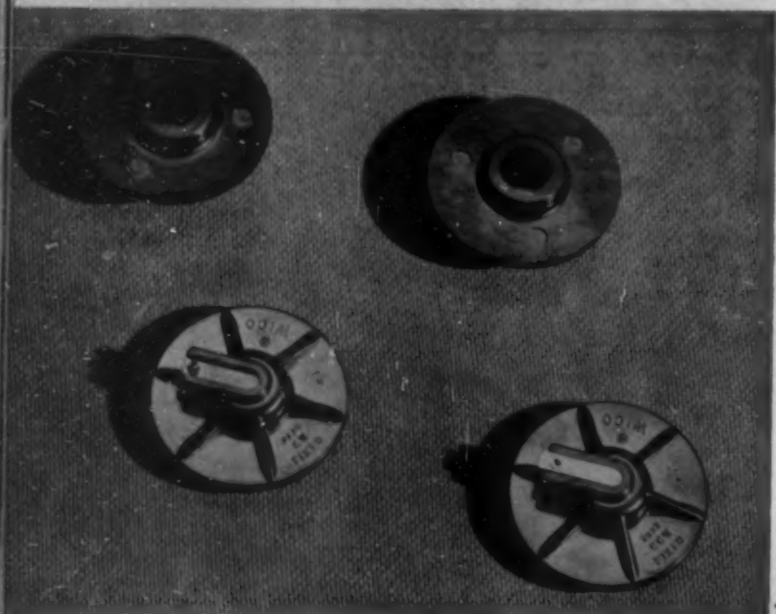

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is interesting to note that on this large magneto Wico went back, unnecessarily, to metal for the gear housing because they were afraid that the strength of plastics was not adequate for this tough service. We say they changed back to metal unnecessarily because they later found that plastics would have been satisfactory. In fact they returned to plastics with their model *C*.

On the *AP*, two types of distributor caps are used—the conventional push terminal type like on the type *C* magneto (Fig. 5) wherein the wires are brought out lengthwise to the magneto and the inverted type wherein the wires are brought down as on the *AP* (Fig. 4). The inverted type is for a special application on the John Deere tractor where the magneto is mounted crosswise of the tractor and projects beyond the side. This projection permits it being struck by corn stalks and cotton stalks which played havoc with the lead wires of the conventional distributor cap first used.

The *A* and *AP* models were made to be somewhat flexible in design—interchangeability of end plates, impulse couplings, etc. Wico decided that if they could design a less flexible magneto (reducing the interchangeability to a minimum) which would be suited for large volume users, they could produce a high quality magneto at a very low cost. This resulted in the type *C* magneto, the latest in design, embodying the ruggedness of the *AP* model and the low cost of the *A* model.

By this time Wico Electric had full appreciation of the possibilities of plastics both from their own actual tests and applications, and from the knowledge gained by maintaining a close contact with their molder. All of this data they put into the development of the *C* model (Fig. 5). They actually designed the *C* magneto from the outside in so that they could take full advantage of the many benefits plastics offered. This, no doubt, is the reason why more than two-thirds of this magneto is housed in plastics (Fig. 9) to reduce the weight, cost of manufacture and assembly, and improve appearance and operation.

By applying plastics in a practical way and by encouraging the molder to work closely with them, combining his knowledge of plastic molding with their knowledge of magnetos, Wico's progress and development has resulted in an asset to any man's engine from the standpoint of appearance, performance and durability. To Wico Electric, the use of plastics, wherever possible, has resulted in reducing machining operations and uniformity of parts, both leading to faster assembly, better quality, lower cost and increased profit—true progress in economy, engineering and designing.

Fig. 7—The terminal post is molded right into the cover on this part. Fig. 8—A molded gear housing allows simple, compact design. Fig. 9—These parts house two-thirds of the model C magneto. Fig. 10—Both mechanical and electrical strength are combined in these molded distributor arms. Fig. 11—Savings in weight and assembly costs, along with better appearance, are obtained in these molded distributor caps. 12—This condenser housing was the first of 22 all-molded magneto parts. All parts are molded of Textolite by General Electric Company